U.S. DEPARTMENT OF COMMERCE
National Technical Information Service
PB-285 587

Draft Environmental Impact Statement Ideal Basic Industries: Cement Plant, Theodore Indusrial Park, Alabama, and Limestone Quarry, Monroe County, Alabama. Appendices - Volume III. Appendix B

(U.S.) Environmental Protection Agency, Atlanta, Ga. Region IV

19 May 78

BIBLIOGRAPHIC DATA SHEET	1. Report No. EPA 904/9-78-005 c	2.	3. Recipient's Accession No. PB285582

4. Title and Subtitle

Draft Environmental Impact Statement
Ideal Basic Industries Cement Plant
Appendices - Volume 3

5. Report Date
May 19, 1978

6.

7. Author(s)
EIS Preparation Section, EIS Branch, EPA RegionIV

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
EIS Branch, EPA Region IV
345 Courtland Street, N.E.
Atlanta, GA 30308

10. Project/Task/Work Unit No.

11. Contract/Grant No.

12. Sponsoring Organization Name and Address
Same as box 9

13. Type of Report & Period Covered
Draft EIS

14.

15. Supplementary Notes

16. Abstracts

Ideal Basic Industries proposes to construct a new cement plant in Theodore Industrial Park near Mobile, Alabama and a supporting limestone quarry in Monroe County Near Monroeville, Alabama. This impact statement addresses the existing air quality in Mobile County and Theodore Industrial Park and the natural environment of the proposed quarry sites. Air emissions at the proposed plant site are modeled and their impacts are projected for the area. The impact of constructing an access road across wetlands are discussed. Mitigative measures to reduce these impacts are presented as well as alternative locations.

17. Key Words and Document Analysis. 17a. Descriptors

Cement manufacture
Limestone quarry
Mobile, Alabam
Kiln
Baghouses
wetlands

17b. Identifiers/Open-Ended Terms

17c. COSATI Field/Group

18. Availability Statement

19. Security Class (This Report)
UNCLASSIFIED

20. Security Class (This Page
UNCLASSIFIED

21. No. of Pages
293

22. Price
A13 - A01

FORM NTIS-35 (REV. 10-73) ENDORSED BY ANSI AND UNESCO. THIS FORM MAY BE REPRODUCED USCOMM-DC 8265-P74

DRAFT
ENVIRONMENTAL IMPACT STATEMENT
IDEAL BASIC INDUSTRIES

CEMENT PLANT
THEODORE INDUSTRIAL PARK, ALABAMA

LIMESTONE QUARRY
MONROE COUNTY, ALABAMA

APPENDICES
VOLUME III

APPENDIX B BASELINE

ECOLOGY
SOCIOECONOMICS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION IV

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U. S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TABLE OF CONTENTS

APPENDIX B. BASELINE

TERRESTRIAL ECOLOGY

INTRODUCTION B-E-1

ECOSYSTEM ANALYSIS (PLANT SITE) B-E-2

EXISTING ENVIRONMENT (1977) B-E-2

- Ecological Structure B-E-2
  - Plant Communities B-E-2
  - Animal Communities B-E-6
- Functional Aspects B-E-18
  - Energetics B-E-18
  - Cycles B-E-19
  - Overall Homeostasis B-E-20
- Uses and Ecological Values of the Ecosystem B-E-23
  - Forest Products B-E-23
  - Soil and Water Conservation and Flood Control B-E-23
  - Wildlife Production B-E-24

PROJECTED 1992 ENVIRONMENT B-E-25

ECOSYSTEM ANALYSIS--QUARRY SITE B-E-28

EXISTING ENVIRONMENT (1977) B-E-28

- Ecological Structure B-E-28
  - Plant Communities B-E-28
  - Animal Communities B-E-34
- Functional Aspects B-E-48
  - Energetics B-E-48
- Cycles B-E-48
- Uses and Ecological Value of the Ecosystems B-E-51
  - Forest Products B-E-51
  - Soil and Water Conservation and Flood Control B-E-51
  - Wildlife Production B-E-53
  - Recreational and Aesthetic Resources B-E-53

PROJECTED ENVIRONMENT 1992 B-E-55

IMPORTANT SPECIES ANALYSIS B-E-59

- Introduction B-E-59
- Plant Site B-E-59
  - Vegetation B-E-59
  - Animals B-E-59

Quarry Site B-E-61
    Vegetation B-E-61
    Animals B-E-61
Discussion of Individual Species B-E-61
    Important Game Species B-E-61
    Fur-Bearing Mammals B-E-69

RARE AND ENDANGERED SPECIES ANALYSIS B-E-72

Introduction B-E-72
Plant Site--Summary B-E-73
Quarry Site--Summary B-E-73
Individual Species Discussion B-E-77
    Plants B-E-77
    Birds B-E-77
    Mammals B-E-81
    Reptiles B-E-82
    Amphibians B-E-84

AQUATIC ECOLOGY

PLANT SITE B-A-E-1

EXISTING ENVIRONMENT B-A-E-1

PROJECTED 1992 ENVIRONMENT B-A-E-6
QUARRY SITE B-A-E-7

EXISTING ENVIRONMENT B-A-E-7

Aquatic Fauna B-A-E-7
    Fishes B-A-E-7
    Rare and Endangered Fishes B-A-E-14
    Benthic Macroinvertebrates B-A-E-15
    Freshwater Mussels (Naiads) B-A-E-21

PROJECTED 1992 ENVIRONMENT B-A-E-22

SOCIOECONOMICS

PLANT SITE: EXISTING ENVIRONMENT (1977) B-P-S-1

REGIONAL ECONOMY B-P-S-1

POPULATION B-P-S-12

FURTHER EXAMINATION OF RECENT TRENDS B-P-S-17

Out-Commuting B-P-S-17
Construction B-P-S-19

Trade and Services B-P-S-19

POPULATION AND HOUSING IN SOUTH MOBILE COUNTY B-P-S-21

LAND USE AND LAND VALUE B-P-S-40

TRANSPORTATION B-P-S-45

- Dauphin Island Parkway B-P-S-47
- Rangeline Road B-P-S-47
- Island Road (Hamilton Road) B-P-S-47
- Rangeline Expressway B-P-S-50
- Eslava Creek Freeway B-P-S-51
- Laurendine Road B-P-S-51

EDUCATIONAL FACILITIES B-P-S-53

WATER AND SEWER SERVICE B-P-S-57

HEALTH FACILITIES B-P-S-59

POLICE AND FIRE PROTECTION B-P-S-61

RECREATION AND OPEN SPACE B-P-S-63

ELECTRIC AND NATURAL GAS SYSTEMS B-P-S-67

LOCAL LAND USE B-P-S-68

- Industry B-P-S-68
- Residential Land B-P-S-68
- Transportation Land B-P-S-71
- Agriculture and Nurseries B-P-S-72
- Industrial, Commercial, and Recreational Land B-P-S-72

GENERAL PLANNING ISSUES B-P-S-73

PROJECTED 1992 ENVIRONMENT B-P-S-77

FUTURE POPULATION AND ECONOMY B-P-S-77

- Theodore Industrial Park and Ship Channel B-P-S-77
- Tennessee-Tombigbee Waterway B-P-S-78
- Petroleum-Related Development B-P-S-79

POPULATION FORECASTS B-P-S-81

FUTURE LAND USE B-P-S-92

- South Bank Area B-P-S-96
- North Bank Area B-P-S-96

- Middle Road B-P-S-97
- San Marino Drive B-P-S-97

PUBLIC SEWERAGE B-P-S-99

HIGHWAY TRANSPORTATION B-P-S-102

FUTURE EDUCATIONAL FACILITIES B-P-S-106

QUARRY SITE B-Q-S-1

EXISTING ENVIRONMENT (1977) B-Q-S-1

- Population and Economy B-Q-S-1

AGRICULTURE B-Q-S-18

HOUSING CHARACTERISTICS B-Q-S-21

COMMERCIAL DEVELOPMENT B-Q-S-30

LAND USE SETTING B-Q-S-34

PRESENT LAND USE B-Q-S-34

FUTURE LAND USE B-Q-S-36

COMMUNITY FACILITIES B-Q-S-37
- Health Care B-Q-S-38
- Education B-Q-S-40
- Law Enforcement B-Q-S-43
- Water and Sewer Service B-Q-S-43
- Fire Protection B-Q-S-44
- Highway Transportation B-Q-S-44
- Recreation B-Q-S-44
- Electric Service B-Q-S-46
- Summary B-Q-S-47

PROJECTED 1992 ENVIRONMENT B-Q-S-48

LIST OF TABLES

Table		Page
	TERRESTRIAL ECOLOGY	
B.E.1	List of Plants Occurring on the Proposed Plant Site	B-E-7
B.E.2	Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County	B-E-9
B.E.3	List of Plants Occurring on the Proposed Quarry Site, Monroe County	B-E-31
B.E.4	Quantitative Characteristics of Overstory Plants at the Quarry Site	B-E-35
B.E.5	Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County	B-E-38
B.E.6	Preferred Foods, in Relative Order of Abundance, of Important Game Species Occurring on the Proposed Quarry Site, Monroe County	B-E-64
B.E.7	List of Vertebrates (Endangered, Threatened, or of Special Concern) Which are Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County, with their Preferred Habitats and Likelihood of Occurrence	B-E-74
B.E.8	List of Plants (Endangered, Threatened, or Species of Special Concern) Which May Occur on the Proposed Plant or Quarry Sites	B-E-75
B.E.9	List of Vertebrates (Endangered, Threatened, or of Special Concern) Which are Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County, with their Preferred Habitats and Likelihood of Occurrence	B-E-76
	AQUATIC ECOLOGY	
B.A.E.1	The More Abundant Fish Species in Monthly Trawl Catches from Middle Deer River, January, 1971, to May, 1972	B-A-E-3

LIST OF TABLES
(continued)

Table		Page
B.A.E.2	The More Abundant Fish Species in Monthly Trawl Catches from Theodore Barge Canal, February, 1971, to May, 1972	B-A-E-4
B.A.E.3	Relative Abundances of Fishes in Cutoff Oxbows and in Adjacent Main Channel of Alabama River at I and II	B-A-E-12
B.A.E.4	Benthic Macroinvertebrate Collections	B-A-E-17

SOCIOECONOMICS

PLANT SITE

Table		Page
B.P.S.1	Estimated Employment Impact of the Port of Mobile, 1973	B-P-S-4
B.P.S.2	Mobile Harbor Freight Traffic, 1975, in Thousands of Short Tons	B-P-S-6
B.P.S.3	Wage and Salary Employment in the Mobile Area	B-P-S-9
B.P.S.4	Commuting Patterns in the Mobile SMSA	B-P-S-11
B.P.S.5	Components of Population Change in the Mobile SMSA	B-P-S-13
B.P.S.6	Relationships of Population to Employment in the Mobile SMSA	B-P-S-14
B.P.S.7	Components of Change in Mobile SMSA Resident Employment, 1970-1976	B-P-S-18
B.P.S.8	Historical Population Trends in South Mobile County	B-P-S-25
B.P.S.9	Population Estimates for Mobile County by Component Area	B-P-S-26
B.P.S.10	Current Population Estimates for South Mobile County, by Component Area	B-P-S-29
B.P.S.11	Sources of Employment for South Mobile County Residents	B-P-S-30
B.P.S.12	Household Estimates for Census Tracts in South Mobile County	B-P-S-32

LIST OF TABLES
(Continued)

Table		Page
B.P.S.13	Dwelling Unit Estimates for Census Tracts in South Mobile County	B-P-S-33
B.P.S.14	Population Characteristics of Census Tracts in South Mobile County, 1970	B-P-S-36
B.P.S.15	Housing Characteristics of Census Tracts in South Mobile County, 1970	B-P-S-37
B.P.S.16	Approximate Hectares (Acreages) of Land in Various Uses, South Mobile County, 1968 and 1975	B-P-S-41
B.P.S.17	Average Daily Traffic Counts for Points on Major Highways in South Mobile County, 1970 and 1976	B-P-S-46
B.P.S.18	Traffic Flow Through the Intersection of Island and Rangeline Roads, 1977	B-P-S-49
B.P.S.19	Public Schools Serving South Mobile County	B-P-S-54
B.P.S.20	Existing Hospital Bed Capacity, Mobile County, Alabama	B-P-S-60
B.P.S.21	Inventory of Recreational Facilities in South Mobile County	B-P-S-64
B.P.S.22	Dwelling Units and Population Near the Proposed Ideal Basic Site as of August, 1977	B-P-S-70
B.P.S.23	Annexation in Alabama Metropolitan Areas, 1960-1970	B-P-S-75
B.P.S.24	Projected Mobile SMSA Population, in Thousands of Persons	B-P-S-82
B.P.S.25	SARPC Population Projections for Mobile County	B-P-S-84
B.P.S.26	Projected Future Population in South Mobile County	B-P-S-86
B.P.S.27	Population Projections for Census Tracts in South Mobile County	B-P-S-88
B.P.S.28	Future Place of Work of South Mobile County Residents	B-P-S-90

LIST OF TABLES
(Continued)

Table		Page
B.P.S.29	Household and Dwelling Unit Forecasts for South Mobile County	B-P-S-90
B.P.S.30	Projected Land Use in South Mobile County	B-P-S-93
B.P.S.31	Estimates of Population Served by Public Sanitary Sewer Facilities in South Mobile County	B-P-S-100
B.P.S.32	Traffic Forecasts for Highways Near the Theodore Industrial Area	B-P-S-103
B.P.S.33	Projected Public School Enrollment in South Mobile County	B-P-S-107
B.P.S.34	Projected Utilization of School Facilities in 1991-1992	B-P-S-109
B.P.S.35	Possible Allocation of Public School Students After Construction of Theodore High School	B-P-S-111

QUARRY SITE

Table		Page
B.Q.S.1	Historical Population Trends in the Quarry Impact Area	B-Q-S-2
B.Q.S.2	Industry Group of Employed Residents in 1970; Counties in Quarry Impact Area	B-Q-S-4
B.Q.S.3	Labor Force Characteristics of Counties in the Quarry Impact Area	B-Q-S-5
B.Q.S.4	Unemployment Trends in the Quarry Impact Area	B-Q-S-5
B.Q.S.5	Commuting Patterns in the Quarry Impact Area, 1970	B-Q-S-7
B.Q.S.6	Income Trends in the Quarry Impact Area	B-Q-S-7
B.Q.S.7	Income in 1969 of 1970 Residents; Quarry Impact Area and State of Alabama	B-Q-S-9
B.Q.S.8	Components of Recent Population Change, Monroe County	B-Q-S-10

LIST OF TABLES
(Continued)

Table		Page
B.Q.S.9	Employment Characteristics by Race; Monroe County, 1970	B-Q-S-13
B.Q.S.10	Labor Force Composition by Race; Monroe County, 1970	B-Q-S-13
B.Q.S.11	Resident Employment in Monroe County, 1970, by Industry, Sex, and Race	B-Q-S-15
B.Q.S.12	Recent Employment Trends in Monroe County	B-Q-S-16
B.Q.S.13	Characteristics of Agriculture in Monroe County	B-Q-S-19
B.Q.S.14	Housing Characteristics of Counties in the Quarry Impact Area, 1970	B-Q-S-22
B.Q.S.15	Potential Dwelling Unit Demand, Monroe County	B-Q-S-24
B.Q.S.16	Population and Dwelling Units Within the 1970 Monroeville City Limits.	B-Q-S-27
B.Q.S.17	Vacancy Analysis of Dwelling Units; Monroeville, 1975	B-Q-S-27
B.Q.S.18	Retail Sales Trends in the Quarry Impact Area	B-Q-S-31
B.Q.S.19	Health Care Statistics for Impact Area Counties	B-Q-S-39
B.Q.S.20	County School Information, Grades 1-12, For Impact Area Counties	B-Q-S-41
B.Q.S.21	Traffic Flow Information for Highways in Monroe County	B-Q-S-45
B.Q.S.22	OBERS Forecasts for Impact Area Counties	B-Q-S-49
B.Q.S.23	Forecasts of Nonagricultural Wage and Salary Employment in Monroe County	B-Q-S-52
B.Q.S.24	Comparison of Population Forecast for Monroe County with OBERS Series E Projections	B-Q-S-52
B.Q.S.25	Household and Dwelling Unit Forecasts for Monroe County	B-Q-S-54
B.Q.S.26	Population and Household Forecasts for Monroeville (1970 City Limits)	B-Q-S-56

LIST OF FIGURES

Figure Page

TERRESTRIAL ECOLOGY

B.E.1 Vegetation Map for the Proposed Plant Site B-E-3

B.E.2 Photographs of Plant Communities B-E-4

B.E.3 Generalized Diagram of Nutrient Cycling in the Marshes of the Proposed Plant Site B-E-21

B.E.4 Ecological Relationships of the Ecosystems of the Proposed Plant Site B-E-22

B.E.5 General Plant Succession and 1992 Baseline Conditions of the Proposed Plant Site B-E-26

B.E.6 Generalized Pattern of Bird and Mammal Succession in Southeastern Forests B-E-27

B.E.7 Vegetation Map of the Proposed Quarry Site B-E-29

B.E.8 Photographs of Vegetational Areas B-E-30

B.E.9 Generalized Diagram of Nutrient Cycling B-E-49

B.E.10 Generalized Diagram of Nutrient Cycling in the Ecosystem of the Proposed Quarry Site B-E-52

B.E.11 Game Species Habitat Map of the Proposed Quarry Site B-E-54

B.E.12 General Plant Succession and 1992 Baseline Conditions of the Proposed Quarry Site B-E-56

B.E.13 Ecological Relationship of the Ecosystems of the Proposed Quarry Site B-E-57

B.E.14 Generalized Pattern of Bird and Mammal Succession in Southeastern Forests B-E-58

AQUATIC ECOLOGY

B.A.E.1 Photographs of Habitat (Thompson Mill Creek) B-A-E-8

B.A.E.2 Photographs of Habitat (Hollinger Creek) B-A-E-9

B.A.E.3 Photographs of Habitat (Randons Creek) B-A-E-10

LIST OF FIGURES
(continued)

Figure Page

SOCIOECONOMICS

B.P.S.1. Definition of South Mobile County Planning Area B-P-S-22

B.P.S.2. Present Land Use in the Vicinity of the Proposed Ideal Basic Industries Plant Site, 1992 B-P-S-69

B.P.S.3. Projected Land Use in the Vicinity of the Proposed Ideal Basic Industries Plant Site, 1992 B-P-S-94

B.Q.S.1 Present Land Use in the Vicinity of the Proposed Ideal Basic Industries Plant Site B-Q-S-35

APPENDIX B. BASELINE
TERRESTRIAL ECOLOGY

INTRODUCTION

For the purpose of highlighting the important ecological and environmental elements in the areas of concern, the analysis of the existing terrestrial environments of the plant and quarry sites is divided into three sections: "Ecosystem Analysis," "Important Species Analysis," and "Rare and Endangered Species Analysis."

"Ecosystem Analysis" describes the ecological systems of the plant and quarry site from structural, functional, and service/value points of view in order to illustrate the dynamics, sensitivities, and importance of these systems. "Important Species Analysis" is a discussion of any commercially or recreationally important plants and animals and of those species which either affect the well-being of these important species or are critical to the structure and function of the ecological systems at the sites. "Rare and Endangered Species Analysis" is a discussion of those plants and animals classified by the Secretary of the Interior or by the Alabama Department of Conservation and Natural Resources as rare, endangered, or threatened.

The analysis of the baseline ecological environment represents existing conditions observed in the spring, summer, and fall, 1977. The 1992 projections for the plant site are based on the assumption that natural ecological succession would be allowed to continue. For the quarry site, the 15-year projection is based on the Conservation Plan developed for Mr. Howard McWilliams by the U.S. Soil Conservation Service, Monroe County Soil Conservation District (May 26, 1974).

ECOSYSTEM ANALYSIS (PLANT SITE)

EXISTING ENVIRONMENT (1977)

Ecological Structure

Plant Communities

There are two major plant communities at the proposed plant site: a modified longleaf pine forest and a marshland which has gum and titi swamps at its perimeter (Figure B.E.1 and Figure B.E.2). The marshland is of two types--fresh and brackish.

The upland areas have a sparse overstory of longleaf pine with a well-developed understory of hardwoods. Longleaf pine development requires periodic fire to clear the underbrush so that the pine seedlings can compete successfully. The study area has been burned periodically during the last 15 years, and mature longleaf pine trees were harvested in 1974. The recent absence of fires allows the more competitive hardwoods to attain their present size and numbers (Hodgkins, 1958).

Once burning ceased and the canopy was opened by lumbering, the increased light further aided the development of the hardwoods. Pines cannot compete with established hardwoods (Quarterman and Keever, 1962). Opening of the canopy has increased the abundance of weedy and/or disturbed area species such as muhly, broomstraw, meadowbeauty, dog-fennel, panic grass, greenbrier, blackberry, grape, and St. John's wort, especially in open areas. Most of the upland area has been affected, either directly or indirectly, by the clearing resulting from lumbering.

Pitcher plant bogs occur in several depressions within the upland areas. These depressions are generally moist and resistant to fire. Insectivorous plants generally grow on nitrogen-deficient soils, in association with yellow-eyed grass, broomstraw, redroot, and bulrush. The area covered by the bogs is small and probably will be invaded by shrubs.

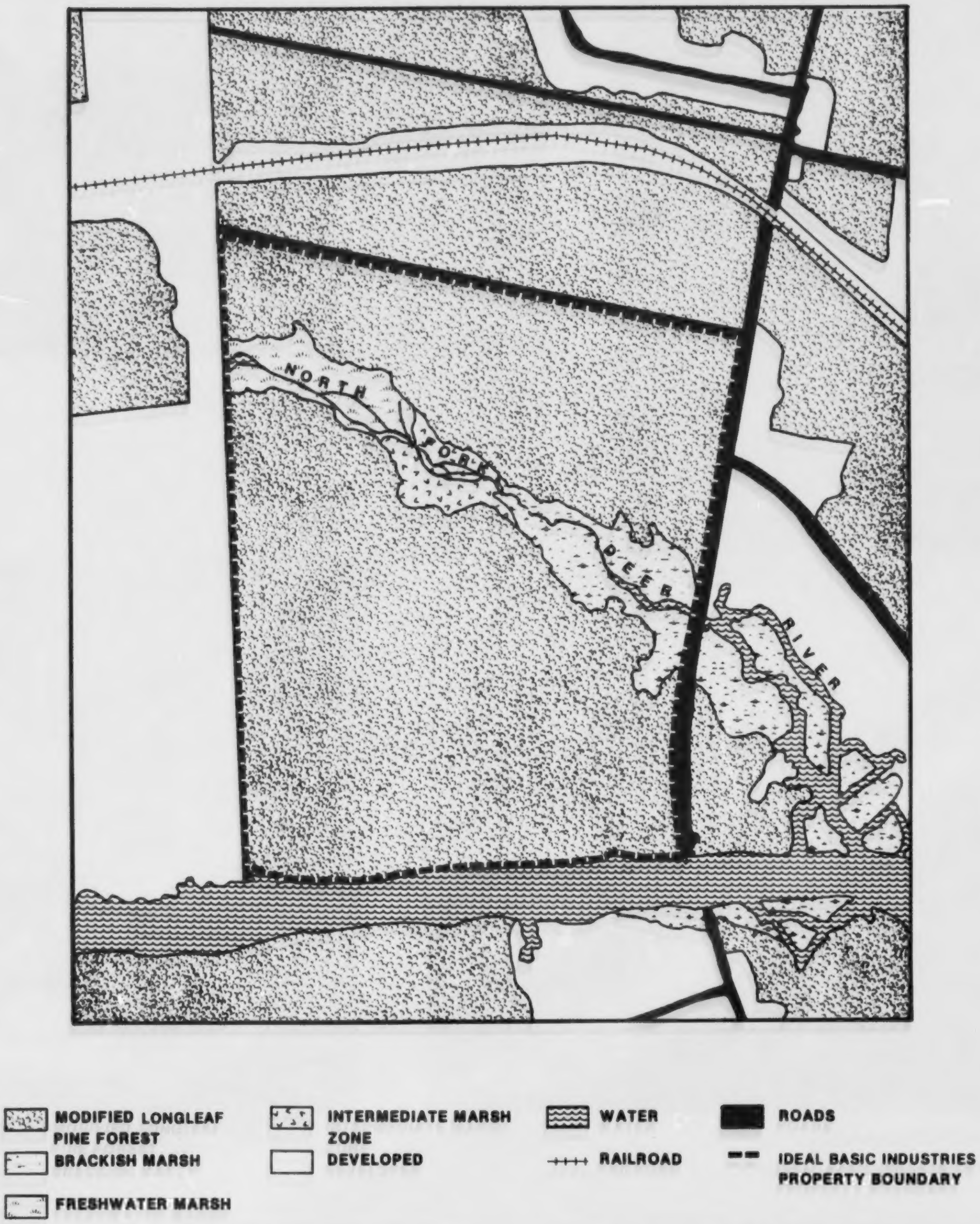

NORTH FORK DEER RIVER
MODIFIED LONGLEAF PINE FOREST
BRACKISH MARSH
FRESHWATER MARSH
INTERMEDIATE MARSH ZONE
DEVELOPED
WATER
RAILROAD
ROADS
IDEAL BASIC INDUSTRIES PROPERTY BOUNDARY

Figure B.E.1
VEGETATION MAP FOR THE PROPOSED PLANT SITE

0 SCALE IN METERS 300

N

SOURCE: Environmental Science and Engineering, Inc., 1977.

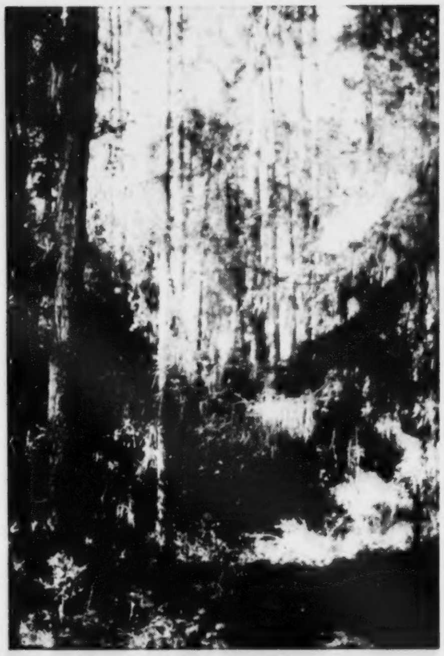
REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

MODIFIED LONGLEAF PINE

FRESHWATER MARSH
(NORTH FORK DEER RIVER)

BRACKISH MARSH
(NORTH FORK DEER RIVER)



LONGLEAF PINE FOREST

Figure B.E.2
PHOTOGRAPHS OF PLANT COMMUNITIES

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

The southwestern side of Mobile Bay has the smallest area of tidal marshlands compared to other areas in the Bay. The brackish marsh at the mouth of the North Fork Deer River is representative of one type of tidal marsh found in Mobile Bay. It is composed of black needlerush which intergrades to sawgrass in the higher river. The sawgrass marsh covers most of the tidal marsh area of the proposed plant site and represents a little over 50 percent of the total marsh area of the site.

The freshwater marsh is separated from the brackish marsh by a higher forested area which apparently has been filled and has stopped the saline influence of tidal waters. Clewell, *et al*. (1976), has described the effect of "damming" saline creeks without installing a culvert to allow tidal exchange. He has shown that following impoundment, vegetation and macroinvertebrates change from saltwater species to freshwater species.

This higher area, called the "intermediate marsh," is characterized by the presence of overstory species. Although small in stature, these species clearly define the upper limit of regular saline influence. The overstory is dominated by titi, black willow, and red maple. Also present, but not abundant, are *Sapium*, black gum, wax myrtle, and bayberry. Ground cover includes spike rush, water hyssop, royal fern, pickerel weed, arrowhead, poison ivy, and climbing hempweed.

Because of species overlaps between the intermediate and fresh marshes, a distinct line of demarcation is absent. Landward from the intermediate zone, overstory species become sparse and are replaced by grasses, goldenrod, dog fennel, and *Coreopsis* sp. Grasses predominate in the center of the marsh, while pickerel weed and arrowhead dominate the marsh edges where the water is deeper and the current is stronger. Ludwigia and bracken fern are also present on the edge of the marsh. Higher in the fresh marsh at the property boundary the vegetation is almost entirely cattail, cane, and reed. Freshwater species also occur but are not abundant.

The plant species which occur on the proposed Mobile site are listed in Table B.E.1.

Animal Communities

Because of the diversity of aquatic and terrestrial habitats (Swingle, _et al_., 1975), the Gulf Coast areas of Alabama contain the largest variety of wildlife found within any region of the state. The vertebrate animal communities of the plant site (see Table B.E.2) reflect this habitat diversity.

With the presence of this wetland, an aquatic-associated group of birds, mammals, reptiles, and amphibians are represented on the site. The marshes have a number of exclusives (species occurring in a single habitat), including marsh wrens, rails, rice rats, nutria, and salt marsh snakes which are adapted to the periodic inundation of the vegetation of the marsh. Other species (e.g., barn owls, fish crows, raccoons, and skunks) are ubiquitous and utilize the marsh as well as a wide variety of other habitats. The most commonly observed vertebrate animals were avian species such as swallows, snipe, sharptailed sparrows, and red-wing blackbirds. Although the fresh and brackish marshes are floristically different and have different salinity patterns, many of the animals are associated with both. The faunal differences between the two marshes are more quantitative than qualitative. For example, there were more red-wing blackbirds seen in the freshwater marsh than in the brackish marsh because cattails provide more suitable nesting habitat.

Some species resident in the marshes also utilize upland habitats. However, the exchange is predominantly in the other direction, and the marshes support several species from surrounding communities.

Table B.E.1. List of Plants Occurring on the Proposed Plant Site

Scientific Name	Common Name
Woody Plants	
Acer rubrum	Red Maple
Baccharis halimifolia	Sea Myrtle, Groundsel Tree
Cephalanthus occidentalis	Buttonbush
Clethra alnifolia	Sweet Pepperbush
Cliftonia monophylla	Cliftonia
Cyrilla racemiflora	Titi, Leatherwood
Diospyros virginiana	Persimmon
Hamamelis virginiana	Witch-hazel
Hypericum nitidum	St. John's Wort
Ilex myrtifolia	Myrtle-leaved Holly
Ilex coriacea	Large or Sweet Gallberry
Ilex glabra	Gallberry
Ilex vomitoria	Yaupon
Magnolia grandiflora	Bull Bay
Magnolia virginiana	Sweet Bay
Myrica cerifera	Wax Myrtle
Myrica heterophylla	Bayberry
Nyssa biflora	Black Gum
Persea palustris	Swamp Bay
Pinus elliotii	Slash Pine
Pinus palustris	Longleaf Pine
Prunus serotina	Black Cherry
Quercus marilandica	Blackjack Oak
Quercus nigra	Water Oak
Quercus virginiana	Live Oak
Rhus radicans	Poison Ivy
Rubus betulifolius	Blackberry
Sapium sebiferum	
Salix nigra	Black Willow
Smilax bona-nox	Greenbrier, Catbrier
Smilax laurifolia	Bamboo
Symplocos tinctoria	Horse Sugar
Vaccinium arboreum	Sparkleberry
Vaccinium myrsinites	Dwarf Blueberry
Viburnum nudum	Possum-haw Viburnum
Vitis rotundifolia	Muscadine
Vitis aestivalis	Summer Grape

Table B.E.1. List of Plants Occurring on the Proposed Plant Site (Continued)

Scientific Name	Common Name
Herbaceous Plants	
Andropogon sp.	Broom-straw
Arundinaria tecta	Cane
Bacopa monnieri	Water Hyssop
Cladium jamaicense	Sawgrass
Coreopsis sp.	Tickseed
Crinum americanum	
Eleocharis parvula	Spike-rush
Eryngium yuccifolium	Button Snakeroot, Rattlesnake Master
Eupatorium capillifolium	Dog-fennel
Ipomoea purpurea	Morning Glory
Ipomoea sagittata	Morning Glory
Juncus roemerianus	Black Needle Rush
Lachnanthes sp.	Redroot
Ludwigia glandulosa	
Lycopodium alopecuroides	Foxtail Clubmoss
Lycopus rubellus	Bugleweed
Lycopus virginicus	Bugleweed
Mikania scandens	Climbing Hempwood
Muhlenbergia sp.	Muhly
Osmunda cinnamomea	Cinnamon Fern
Osmunda regalis	Royal Fern
Panicum spp.	Panic Grass
Peltandra virginiana	Arrow-arum
Phragmites australis	Reed
Pluchea rosea	Marsh Fleabane
Polygonum hydropiperoides	Smartweed
Pontedari	Pickerel Weed
Pteridium aquilinum	Bracken Fern
Rhexia sp.	Meadow beauty
Sagittaria lancifolia	Arrowhead
Sarracenia flava	Trumpets, Pitcher Plant
Saururus cernuus	Lizard's Tail
Scirpus americanus	Bulrush
Scirpus robustus	Bulrush
Serenoa repens	Saw Palmetto
Solidago	Goldenrod
Spartina bakeri	Sand Cordgrass
Typha domingensis	Cat-tail
Typha latifolia	Common Cat-tail
Woodwardia virginica	Virginia Chain Fern
Xyris sp.	Yellow-eyed grass

Source: Environmental Science and Engineering, 1977.

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Caudata					
Ambystomatidae					
Ambystoma cingulatum	Flatwoods salamander		X		
Ambystoma talpoideum	Mole salamander		X	X	
Ambystoma tigrinum trigrinum	Tiger salamander			X	
Salamandridae					
Notophthalamus viridescens louisianensis	Central newt		X	X	
Plethodontidae					
Plethodon glutinosus	Slimy salamander		X		
Amphiumidae					
Amphiuma means means	Two-toed congo eel			X	
Necturidae					
Necturus punctatus	Southern mud puppy			X	
Anura					
Pelobatidae					
Scaphiopus holbrooki	Eastern spadefoot toad		X		
Ranidae					
Rana areolata	Gopher frog		X		
Rana catesbeiana	Bullfrog			X	
Rana clamitans	Bronze frog			X	
Rana grylio	Pig frog			X	
Rana hecksheri	River frog			X	X
Rana utricularia	Southern leopard frog			X	
Microhylidae					
Gastrophryne carolinensis	Eastern narrow-mouth toad		X		
Bufonidae					
Bufo quercicus	Oak toad		X	X	
Bufo terrestris terrestris	Southern toad			X	
Bufo woodhousei fowleri	Fowler's toad		X	X	
Hylidae					
Acris gryllus gryllus	Southern cricket frog	X		X	
Hyla crucifer crucifer	Northern spring peeper	X		X	
Hyla cinerea cinerea	Green treefrog	X		X	
Hyla femoralis	Pine woods treefrog		X		
Hyla squirella	Squirrel treefrog		X		
Hyla versicolor	Gray treefrog	X	X	X	
Pseudacris nigrita nigrita	Southern chorus frog		X		
Pseudacris ornata	Ornate chorus frog		X		
Testudines					
Chelydridae					
Chelyolra serpentina serpentina	Snapping turtle			X	
Kinosternidae					
Stenotherus odoratus	Musk turtle			X	
Stenotherus minor	Loggerhead musk turtle			X	
Kinosternon subrubrum hippocrepis	Mud turtle			X	
Emydidae					
Terrapene carolina major	Gulf Coast box turtle		X		
Terrapene carolina triunguis	Three-toed box turtle		X		
Malaclemys terrapin	Diamondback terrapin				X

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Emydidae (cont'd)					
Graptemys pulchra	Alabama map turtle			X	
Chrysemys alabamensis	Alabama red-bellied turtle			X	
Chrysemys scipta elegans	Red-eared turtle			X	
Chrysemys picta dorsalis	Southern painted turtle		X		
Chrysemys scripta scripta	Yellow-bellied turtle			X	
Deirochelys reticularia	Chicken turtle			X	
Testudinidae					
Gopherus polyphemus	Gopher tortoise		X		
Trionychidae					
Trionyx muticus calvatus	Gulf Coast smooth soft-shelled turtle			X	
Trionyx spiniferus asper	Gulf Coast spiny soft-shelled turtle			X	
Crocodylia					
Alligatoridae					
Alligator mississippiensis	American alligator	X		X	X
Squamata					
Iguanidae					
Anolis carolinensis	Green anole	X	X		
Sceloporus undulatus	Fence lizard	X	X		
Scincidae					
Leiolopisma laterale	Ground skink	X	X		
Eumeces fasciatus	Five-lined skink		X		
Eumeces inexpectatus	Southeastern five-lined skink		X		
Teiidae					
Cnemidophorus sexlineatus	Six-lined racerunner	X	X		
Anguidae					
Ophisaurus ventralis	Eastern glass lizard		X		
Ophisaurus longicauda	Slender glass lizard		X		
Colubridae					
Natrix fasciata fasciata	Banded water snake			X	
Natrix fasciata clarki	Gulf salt marsh snake				X
Natrix erythrogaster flavigaster	Yellow-bellied water snake			X	
Natrix cyclopion	Green water snake			X	
Natrix rhombifera rhombifera	Diamond-backed water snake			X	
Natrix rigida	Glossy water snake			X	
Seminatrix pygaea	Black swamp snake			X	
Thamnophis sirtalis	Garter snake			X	
Thamnophis sauritus	Ribbon snake			X	
Virginia striatula	Rough earth snake		X		
Virginia valeriae	Smooth earth snake		X		
Storeria occipitomaculata	Red-bellied snake		X		
Storeria dekayi	Brown snake		X		
Heterodon platyrhinos	Eastern hognose snake		X		
Heterodon simus	Southern hognose snake		X		
Diadophis punctatus	Ringneck snake		X		
Farancia erytrogramma	Rainbow snake		X		
Farancia abacura	Mud snake				X
Coluber constrictor	Black racer		X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Colubridae (cont'd)					
Masticophis flagellum	Eastern coachwhip		X		
Opheodrys aestivus	Rough green snake		X		
Elaphe guttata guttata	Corn snake		X		
Elaphe obsoleta	Gray rat snake		X		
Pituophus melanoleucus lodingi	Black pine snake		X		
Drymarchon corais couperi	Indigo snake		X		
Lampropeltis calligaster	Mole snake		X		
Lampropeltis getulus holbrooki	Speckled kingsnake		X		
Lampropeltis triangulum elapsoides	Scarlet kingsnake		X		
Cemophora coccinea	Scarlet snake		X		
Rhadinaca flavilata	Pine woods snake		X		
Tantilla coronata	Southeastern crowned snake		X		
Elapidae					
Micrurus fulvius fulvius	Eastern coral snake		X		
Viperidae					
Agkistrodon piscivorus conanti	Florida cottonmouth			X	
Sistrurus miliarius barbouri	Dusky pigmy rattlesnake		X		
Crotalus horridus atricaudatus	Canebrake rattlesnake		X		
Crotalus adamanteus	Eastern diamondback rattlesnake		X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County, (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Podicipediformes						
Podiceps caspicus	Eared grebe					X
Podiceps podilymbus	Pied-billed grebe		X		X	
Pelecaniformes						
Pelecanus erythrorhynchos	White pelican					X
Pelecanus occidentalis	Brown pelican					X
Phalacrocorax auritus	Double-crested cormorant			X	X	X
Anhinga anhinga	Anhinga		X		X	X
Ciconiiformes						
Ardea herodias	Great blue heron		X		X	X
Butorides striatus	Green heron		X		X	X
Florida caerulea	Little blue heron		X		X	X
Bubulcus ibis	Cattle egret		X		X	X
Casmerodius albus	Great egret		X		X	X
Egretta thula	Snowy egret		X		X	X
Hydranassa tricolor	Louisiana heron		X		X	X
Nycticorax nycticorax	Black-crowned night heron	X	X			X
Nyctanassa violacea	Yellow-crowned night heron		X		X	X
Ixobrychus exilis	Least bittern		X		X	X
Botaurus lentiginosus	American bittern		?		X	X
Mycteria americana	Wood stork		?		X	
Plegadis falcinellus	Glossy ibis		X		X	X
Eudocimus albus	White ibis		X		X	X
Plegadis chihi	White-faced ibis				X	X
Anseriformes						
Branta canadensis	Canada goose				X	
Chen caerulescens	Snow goose				X	
Dendrocygna bicolor	Fulvous whistling duck		X		X	X
Anas platyrhynchos	Mallard		X		X	X
Anas rubripes	Black duck		X		X	X
Anas fulvigula	Mottled duck		X		X	X
Anas strepera	Gadwall				X	X
Anas acuta	Pintail				X	X
Anas crecca carolinensis	Green-winged teal				X	X
Anas discors	Blue-winged teal				X	X
Anas americana	American widgeon				X	X
Anas clypeata	Northern shoveler		X		X	X
Aix sponsa	Wood duck		X		X	X
Aytha valisineria	Canvasback				X	X
Bucephala albeola	Bufflehead				X	X
Oxyura jamaicensis	Ruddy duck				X	X
Lophodytes cucullatus	Hooded merganser		X		X	X
Falconiformes						
Cathartes aura	Turkey vulture	X	X	X	X	X
Coragyps atratus	Black vulture		X	X	X	X
Elanoides forficatus	Swallow-tailed kite		X		X	
Ectinia misisippiensis	Mississippi kite		X		X	X
Accipiter cooperii	Cooper's hawk		X	X		
Buteo jamaicensis	Red-tailed hawk	X		X	X	X
Buteo lineatus	Red-shouldered hawk		X	X		
Buteo platypterus	Broad-winged hawk		X	X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Falconiformes (continued)						
Haliaeetus leucocephalus	Bald eagle				X	
Circus cyaneus	Marsh hawk			X	X	X
Pandion haliaetus	Osprey		X	X	X	X
Falco columbarius	Merlin	X		X	X	X
Falco sparverius	American kestrel	X	X	X		
Galliformes						
Colinus virginianus	Bobwhite	X	X	X		
Gruiformes						
Grus canadensis	Sandhill crane		X		X	X
Rallus elegans	King rail	X	X		X	X
Rallus longirostris	Clapper rail	X	X		X	X
Rallus limicola	Virginia rail		X		X	
Porzana carolina	Sora	X			X	X
Coturnicops noveboracensis	Yellow rail				X	
Laterallus jamaicensis	Black rail		X		X	X
Porphyrula martinica	Purple gallinule		X		X	
Gallinula chloropus	Common gallinule		X		X	
Fulica americana	American coot		X		X	X
Charadriiformes						
Haematopus mexicanus	Black-necked stilt		X		X	X
Charadrius vociferus	Killdeer	X	X		X	X
Capella gallinago	Common snipe	X			X	
Calidris melanotos	Pectoral sandpiper				X	X
Recurvirostra americana	American avocet				X	X
Larus hyperboreus	Glaucous gull			X	X	X
Larus argentatus	Herring gull	X			X	X
Larus delawarensis	Ring-billed gull				X	X
Gelochelidon nilotica	Gull-billed tern		X		X	X
Sterna forsteri	Forster's tern		X		X	X
Sterna caspia	Caspian tern		?		X	X
Chlidonias niger	Black tern				X	
Columbiformes						
Columba livia	Rock dove	X	X	X	X	X
Zenaida macroura	Mourning dove	X	X	X	X	X
Columbina passerina	Ground dove	X	X	X		
Cuculiformes						
Coccyzus americanus	Yellow-billed cuckoo		X	X		
Strigiformes						
Tyto alba	Barn owl		X	X	X	X
Otus asio	Screech owl		X	X		
Bubo virginianus	Great horned owl		X	X	X	X
Strix varia	Barred owl		X	X	X	X
Asio flammeus	Short-eared owl				X	X
Caprimulgiformes						
Caprimulgus carolinensis	Chuck-will's widow	X	X	X		
Caprimulgus vociferus	Whip-poor-will		X	X		
Chordeiles minor	Common nighthawk		X	X		
Apodiformes						
Chaetura pelagica	Chimney swift		X	X	X	
Archilochus colubris	Ruby-throated hummingbird		X	X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Coraciiformes						
Megaceryle alcyon	Belted kingfisher	X	X	X	X	X
Piciformes						
Colaptes auratus	Common flicker	X	X	X	X	
Dryocopus pileatus	Pileated woodpecker	X	X	X		
Centurus carolinus	Red-bellied woodpecker	X	X	X		
Melanerpes erythrocephalus	Red-headed woodpecker		X	X		
Sphyrapicus varius	Yellow-bellied sapsucker			X		
Picoides villous	Hairy woodpecker	X	X	X	X	X
Picoides pubescens	Downy woodpecker		X	X		
Picoides borealis	Red-cockaded woodpecker		X	X		
Passeriformes						
Tyrannus tyrannus	Eastern kingbird	X	X	X	X	
Tyrannus dominicensis	Gray kingbird		X	X		
Muscivora forficata	Scissor-tailed flycatcher			X		
Myiarchus crinitus	Great crested flycatcher	X	X	X		
Myiarchus cinerascens	Ash-throated flycatcher			X		
Empidonax virescens	Acadian flycatcher		X	X		
Empidonax minimus	Least flycatcher			X		
Contopus virens	Eastern wood peewee		X	X		
Riparia riparia	Bank swallow				X	
Stelgidopteryx ruficollis	Rough-winged swallow	X		X	X	X
Hirundo rustica	Barn swallow		X	X	X	X
Petrochelidon pyrrhonata	Cliff swallow			X	X	X
Progne subis	Purple martin				X	X
Cyanocitta cristata	Blue jay	X	X	X	X	X
Corvus ossifragus	Fish crow	X	X		X	X
Parus carolinensis	Carolina chickadee		X	X		
Parus bicolor	Tufted titmouse	X	X	X		X
Sitta canadensis	Red-breasted nuthatch			X		
Sitta pusilla	Brown-headed nuthatch		X	X		
Certhia familiaris	Brown creeper			X		
Thryothorus ludovicianus	Carolina wren	X	X	X	X	X
Cistothorus palustris	Long-billed marsh wren	X			X	X
Cistothorus platensis	Short-billed marsh wren				X	X
Minus polyglottos	Mockingbird	X	X	X		
Dumetella carolinensis	Gray catbird	X	X	X		
Toxostoma rufum	Brown thrasher	X	X	X		
Turdus migratorius	American robin		X	X	X	X
Catharus guttatus	Hermit thrush			X		
Catharus ustulatus	Swainson's thrush			X		
Catharus minimus	Gray-cheeked thrush			X		
Catharus fuscescens	Veery		X	X		
Hylocichla mustelina	Wood thrush		X	X		
Sialia sialis	Eastern bluebird		X	X		
Polioptila caerulea	Blue-gray gnatcatcher		X	X		
Regulus satrapa	Golden-crowned kinglet			X		
Regulus calendula	Ruby-crowned kinglet			X		
Bombycilla cedrorum	Cedar waxwing		X	X		
Lanius ludovicianus	Loggerhead shrike	X	X	X		
Sturvus vulgaris	Starling	X	X	X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Passeriformes, (cont'd)						
Vireo griseus	White-eyed vireo		X	X		
Vireo flavifrons	Yellow-throat vireo		X	X		
Vireo solitarius	Solitary vireo		X	X		
Vireo olivaceus	Red-eyed vireo	X	X	X		
Vireo philadelphicus	Philadelphia vireo			X		
Mniotilta varia	Black and white warbler		X	X		
Vermivora peregrina	Tennessee warbler			X		
Vermivora celata	Orange-crowned warbler			X		
Parula americana	Northern parula		X	X		
Dendroica magnolia	Magnolia warbler			X		
Dendroica coronata	Yellow-rumped warbler			X		
Dendroica dominica	Yellow-throated warbler		X	X		
Dendroica pensylvanica	Chestnut-sided warbler		X	X		
Dendroica striata	Blackpoll warbler			X		
Dendroica pinus	Pine warbler		X	X		
Dendroica discolor	Prairie warbler		X	X		
Dendroica palmarum	Palm warbler			X		
Seiurus noveboracensis	Northern waterthrush				X	X
Seiurus motacilla	Louisiana waterthrush		X	X		
Geothlypis trichas	Common yellowthroat	X	X		X	
Icteria virens	Yellow-breasted chat		X	X		
Wilsonia canadensis	Canada warbler			X		
Passer domesticus	House sparrow	X	X	X		
Dolichonyx oryzivorus	Bobolink				X	
Sturnella magna	Eastern meadowlark	X			X	X
Agelaius pheoniceus	Redwing blackbird	X	X			X
Icterus spurius	Orchard oriole	X	X	X		
Icterus galbula	Northern oriole		X	X		
Euphagus carolinus	Rusty blackbird				X	
Quiscalus major	Boat-tailed grackle		X		X	X
Euphagus cyanocephalus	Brewer's blackbird	X			X	
Molothrus ater	Brown-headed cowbird	X	X		X	
Pheucticus ludovicianus	Rose-breasted grosbeak			X		
Cardinalis cardinalis	Cardinal	X	X	X		
Guiraca caerulea	Blue grosbeak		X	X		
Passerina cyaena	Indigo bunting		X	X		
Passerina ciris	Painted bunting		X	X		
Hesperiphona vespertina	Evening grosbeak			X		
Carpodacus purpureus	Purple finch			X		
Spiza americana	Dickcissel		X		X	
Pipilo erythrophthalmus	Rufous-sided towhee	X	X	X		
Ammospiza caudacuta	Sharptailed sparrow	X			X	X
Ammospiza maritima	Seaside sparrow	X			X	X
Passerculus sandvicensis sandvicensis	Savannah sparrow				X	
Ammodramus savannarum	Grasshopper sparrow		X		X	
Pooecetes gramineus	Vesper sparrow			X		
Aimophila aestivalis	Bachman's sparrow		X	X		
Zonotrichia leucophrys	White-crowned sparrow			X		
Zonotrichia albicollis	White-throated sparrow			X		
Passerella iliaca	Fox sparrow			X		
Melospiza georgiana	Swamp sparrow	X			X	
Melospiza melodia	Song sparrow		X	X		

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Marsupiala					
Didelphidae					
Didelphis marsupialis	Opossum	X	X		
Insectivora					
Soricidae					
Blarina brevicauda	Shorttail shrew		X		
Cryptotis parva	Least shrew		X		
Talpidae					
Scalopus aquaticus	Eastern mole		X		
Condylura cristata	Starnose mole		X	X	
Chiroptera					
Vespertilionidae					
Myotis austroriparius	Mississippi myotis		X	X	X
Pipistrellus subflavas	Eastern pipistrel		X	X	X
Eptesicus fuscus	Big brown bat		X	X	X
Lasiurus borealis	Red bat		X	X	X
Lasiurus seminolus	Seminole bat		X	X	X
Lasiurus intermedius	Yellow bat		X	X	X
Lasiurus cinereus	Hoary bat		X	X	X
Nycticeius humeralis	Evening bat		X	X	X
Plecotus rafinesquei	Big-eared bat		X	X	X
Edentata					
Dasypodidae					
Dasypus novemcinctus	Nine-banded armadillo		X		
Lagomorpha					
Leporidae					
Sylvilagus floridanus	Eastern cottontail	X	X		
Sylvilagus aquaticus	Swamp rabbit	X	X	X	
Sylvilagus palustris	Marsh rabbit			X	X
Rodentia					
Sciuridae					
Sciurus carolinensis	Gray squirrel	X	X		
Sciurus niger	Fox squirrel		X		
Glaucomys volans	Southern flying squirrel		X		
Cricetidae					
Oryzomys palustris	Rice rat			X	X
Peromyscus gossypinus	Cotton mouse		X		
Sigmodon hispidus	Cotton rat			X	
Neotoma floridana	Eastern woodrat		X		
Ondatra zibethicus	Louisiana muskrat		X	X	
Muridae					
Rattus norvegicus	Norway rat				X
Rattus rattus	Black rat		X	X	X
Mus musculus	House mouse		X		
Carnivora					
Canidae					
Vulpus fulva	Red fox	X	X		
Urocyon cinereoargenteus	Gray fox		X		
Canis familiaris	Feral dog		X	X	X
Procyonidae					
Procyon lotor	Raccoon	X	X	X	X

Table B.E.2. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Fresh Marsh	Brackish Marsh
Carnivora (cont'd.)					
Mustelidae					
Mustela vison	Mink			X	X
Lutra canadensis	River otter			X	X
Felidae					
Lynx rufus	Bobcat		X	X	
Felis catus	Feral cat		X	X	
Artiodactyla					
Cervidae					
Odocoileus virginianus	White-tailed deer		X	X	

Source: Environmental Science and Engineering, Inc., 1977.

The longleaf pine animal community is characterized by a number of exclusives--nuthatches, warblers, squirrels, flatwoods salamanders, and black pine snakes. A greater number of ubiquitous species, including raccoons, rabbits, crows, jays, marsh hawks, slimy salamanders, and the Florida box turtle, are also associated with the longleaf pine community. Some of the more commonly observed animals in the area were cardinals, quail, doves, red-bellied woodpeckers, raccoons and rabbits (cottontail and swamp). The recent logging of the longleaf pine forest has reduced the quality of animal habitat, especially for exclusive types.

In addition to changes in population numbers resulting from reproduction, primarily in spring and summer, there are temporary changes in species composition when migrating birds stop-over in spring and fall (Imhof, 1976). Some of these migrants (e.g., cardinals and Carolina wrens) remain in the area and augment resident populations of the same species.

Bogs are one of the several smaller habitats included within the longleaf pine community. Some reptiles and amphibians, such as scarlet kingsnake and flatwoods salamanders, are more common in bogs. Because of the extremely dry conditions, a thorough analysis of aquatic habitats was impossible.

Functional Aspects

Energetics

The productivity of the longleaf pine forest is similar to that detailed for the proposed quarry site. In general, the net productivity of early successional stages such as those on the site, is high compared to more mature communities.

Tidal marshes have high productivities. Estimates range as high as 3750 g dry weight m^{-2}/yr (0.77 pounds per square foot per year) (Gosselink, et. al., 1973). This production is mainly exported to estuarine areas and bays and provides important nutrient sources for important nutrient sources for estuarine animals. The tidal marshes serve as important nursery grounds for the young of most commercial species of seafood (see Aquatic Ecology section).

Brackish marshes may have higher productivities than freshwater marshes. Odum and Fanning (1973) found higher productivity in *Spartina alterniflora*, a salt marsh plant, than in *Spartina cynosuroides*, a freshwater species. The brackish marsh is under tidal influence and exports detritus to the estuaries and to Mobile Bay. These exported materials are very important to commercial marine seafood organisms.

Juncus roemarianus, one of the dominant brackish marsh species, has production values ranging from 560 to 2,000 g dry wt m^{-2}/yr (0.11 to 0.41 pounds per square foot per year) for above-ground vegetation (de la Cruz, 1973). These production values are relatively high compared to other plants and result in peat accumulation and in detritus export. At the Mobile site, peat has accumulated to a depth of 50 centimeters (20 inches) or more, and it is augmented by silt carried from the uplands, especially at the upper end. The intermediate zone tends to reduce the siltation in the brackish marsh.

Cycles

A general discussion of the cycling of elements in the longleaf pine forest is found in the description of the proposed quarry site. At the plant site, the nutrient cycle has been disrupted because of recent lumbering and road building. Erosion at the site indicates loss of nutrients to other systems, including the marsh. Reduction in litterfall has diminished the major nutrient reservoir for the forest. The hardwoods now developing on the site have high rates of uptake and storage of nutrients so that they reduce losses of nutrients to surrounding systems. However, losses are still greater than in more mature forests (Vitousek and Reiners, 1975). As the hardwoods develop, the nutrient cycles become more closed, which will result in a more efficient use and better retention of nutrients.

Generally, whether a marsh is fresh or saline, solar energy fixed into organic chemical energy enters the soil and water as organic detritus or dissolved organic carbon. Some surface water nutrients reach equilibrium with soil nutrients; some are concentrated around or within plants or animals. Plants, filter feeders, and detritus feeders utilize this material. These organisms then become the food source of macroinvertebrates and vertebrates within the system (fishes, crabs, anemones, raccoons, etc.). Death and subsequent decay of these organisms effectively cycle these nutrients within the system. The concentrations of available phosphorus and nitrogen in tidal marshes are significantly higher than those in the bay or the inflowing streams and rivers. Marshes act as nutrient cycle pumps.

The marshes at the site have two additional major nutrient inputs from the North Fork Deer River drainage system and from the surrounding longleaf pine forest (see Figure B.E.3).

There is twice as much gray silt [12 centimeters (5 inches)] in the upper end of the freshwater marsh as in the intermediate marsh [5 centimeters (2 inches)]. The amount of silt decreases slightly from the intermediate marsh through the brackish marsh. This silting pattern is indicative of additional imports to the marsh system and of the filtering effect of the marsh. The water quality study of the North Fork Deer River points out the loading of the marsh nutrient cycles by offsite sources (see the Water Resources section).

Overall Homeostasis

The overall homeostasis of the ecological systems of the proposed plant site has to be viewed in terms of the two major subsystems on the site, the marshes and the longleaf pine community. Figure B.E.4 details some general relationships between the major subsystems on the site.

The wetlands show the greater homeostasis of the two systems on the site. The marshes are the center of interactions for both the biotic

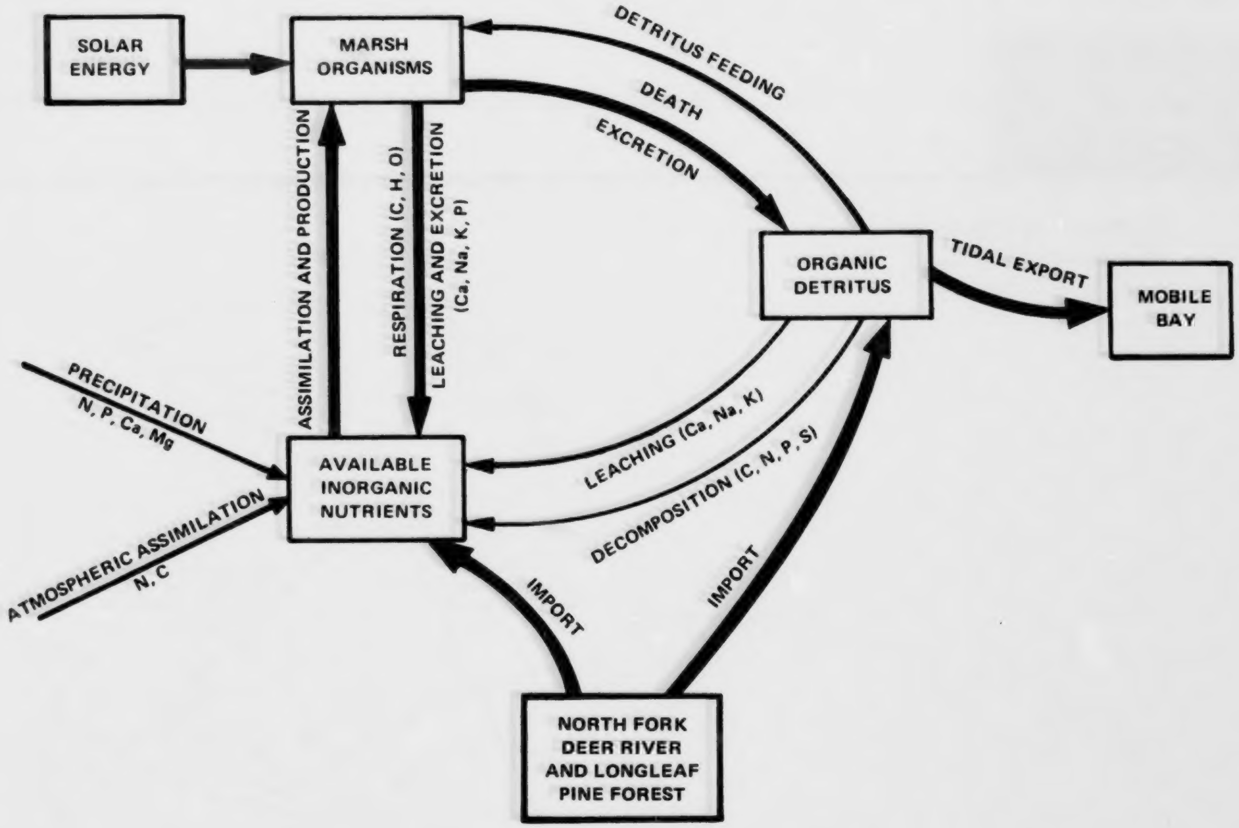

SOLAR ENERGY
MARSH ORGANISMS
DETRITUS FEEDING
DEATH
EXCRETION
ORGANIC DETRITUS
TIDAL EXPORT
MOBILE BAY
ASSIMILATION AND PRODUCTION
RESPIRATION (C, H, O)
LEACHING AND EXCRETION (Ca, Na, K, P)
PRECIPITATION N, P, Ca, Mg
ATMOSPHERIC ASSIMILATION N, C
AVAILABLE INORGANIC NUTRIENTS
LEACHING (Ca, Na, K)
DECOMPOSITION (C, N, P, S)
IMPORT
IMPORT
NORTH FORK DEER RIVER AND LONGLEAF PINE FOREST

Figure B.E.3
GENERALIZED DIAGRAM OF NUTRIENT CYCLING IN THE MARSHES OF THE PROPOSED PLANT SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

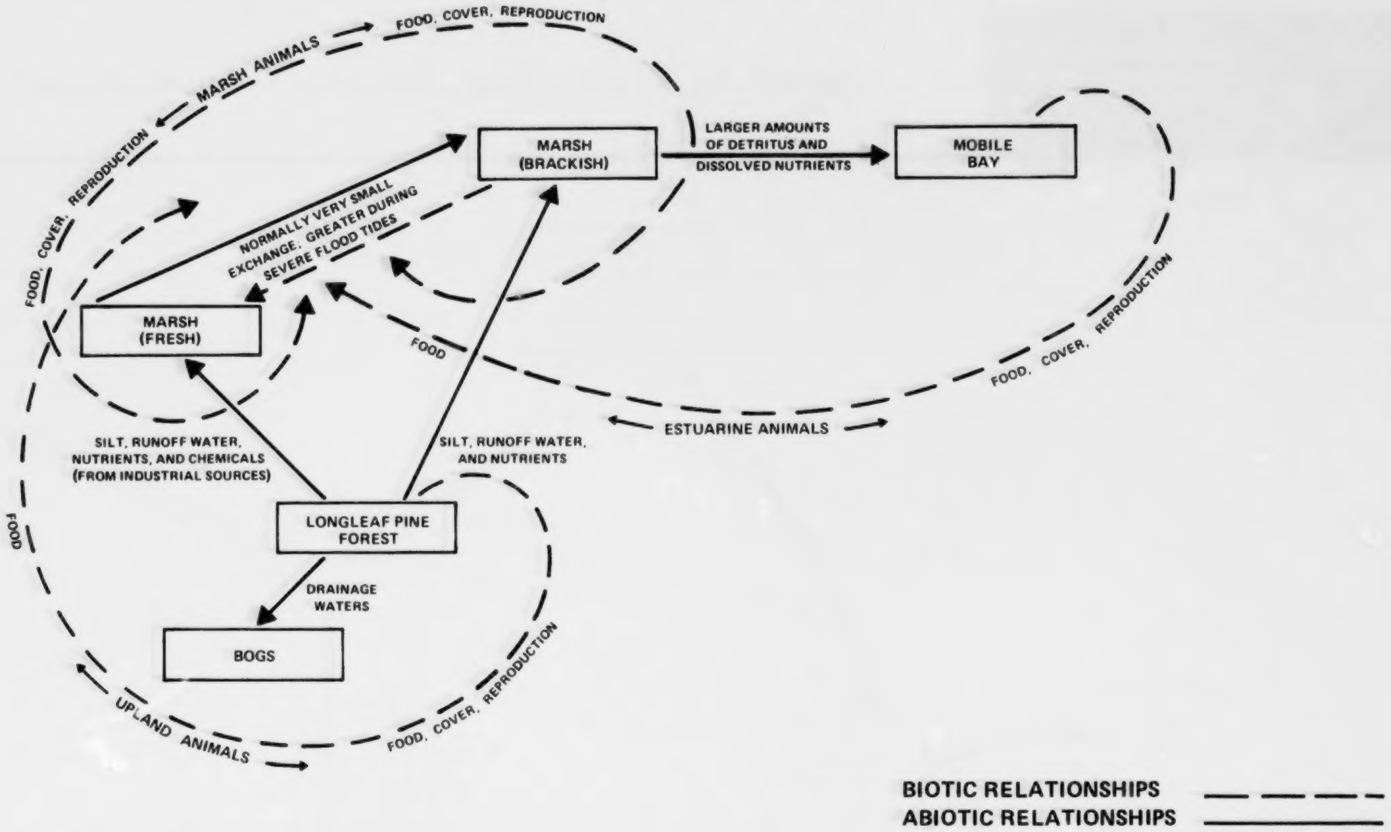

FOOD, COVER, REPRODUCTION
MARSH ANIMALS
FOOD, COVER, REPRODUCTION
MARSH (BRACKISH)
LARGER AMOUNTS OF DETRITUS AND DISSOLVED NUTRIENTS
MOBILE BAY
NORMALLY VERY SMALL EXCHANGE; GREATER DURING SEVERE FLOOD TIDES
MARSH (FRESH)
FOOD
FOOD, COVER, REPRODUCTION
ESTUARINE ANIMALS
SILT, RUNOFF WATER, NUTRIENTS, AND CHEMICALS (FROM INDUSTRIAL SOURCES)
SILT, RUNOFF WATER, AND NUTRIENTS
LONGLEAF PINE FOREST
FOOD
DRAINAGE WATERS
BOGS
UPLAND ANIMALS
FOOD, COVER, REPRODUCTION
BIOTIC RELATIONSHIPS
ABIOTIC RELATIONSHIPS

Figure B.E.4
ECOLOGICAL RELATIONSHIPS OF THE ECOSYSTEMS OF THE PROPOSED PLANT SITE

SOURCE. Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

and abiotic processes occurring on the site. They act as the major buffers or intermediary systems between the bay and the uplands. The marshes filter chemical inputs from the uplands going to Mobile Bay. For example, the concentrations of iron, mercury, and lead are respectively 3.5, 2.3, and 1.5 times less in water leaving the marsh than in water entering the marsh.

The present disturbed nature of the site is characterized by poor nutrient conservation (erosion, leaching, etc.), poor microclimate regulation (drying of bogs in logged and early regrowth areas), and less stabilized and shorter food webs associated with its early successional state (Odum, 1971).

Uses and Ecological Values of the Ecosystem

Forest Products

The upland vegetation of the proposed plant site has little value in terms of merchantable timber because of previous lumbering, disturbance, and its limited area. Pine, the major lumber tree of Alabama, is not reproducing well because of the lack of management of the hardwoods. Existing trees are competing poorly with the hardwoods.

Soil and Water Conservation and Flood Control

Forest communities normally contribute much to soil retention and formation as well as flood control, surface water storage, and recharge. The disturbed condition of the site impairs or limits these services and their value to the ecosystems of the area.

Wetlands are valuable resources for water conservation, flood control, and recycling wastes (Wharton, et al., 1976). The marshes of the site are fairly undisturbed and provide these services. The wetlands of the site contribute to the better quality of water going into Mobile Bay from the North Fork Deer River drainage area, which has become industrialized.

Wildlife Production

The upland area of the site supports some small game species, namely cottontail and swamp rabbit, bobwhite quail and mourning dove; however, because of the limited land area, the populations of these species are small. Fur-bearing animals cannot be expected to occur in large numbers because of the limited area.

Wetlands are recognized as valuable resources which provide food, cover, and nesting areas for recreationally and commercially important wildlife and fisheries species. Nutria, as well as raccoons and rails, are common in both marshes, and waterfowl inhabit the marshes during the winter.

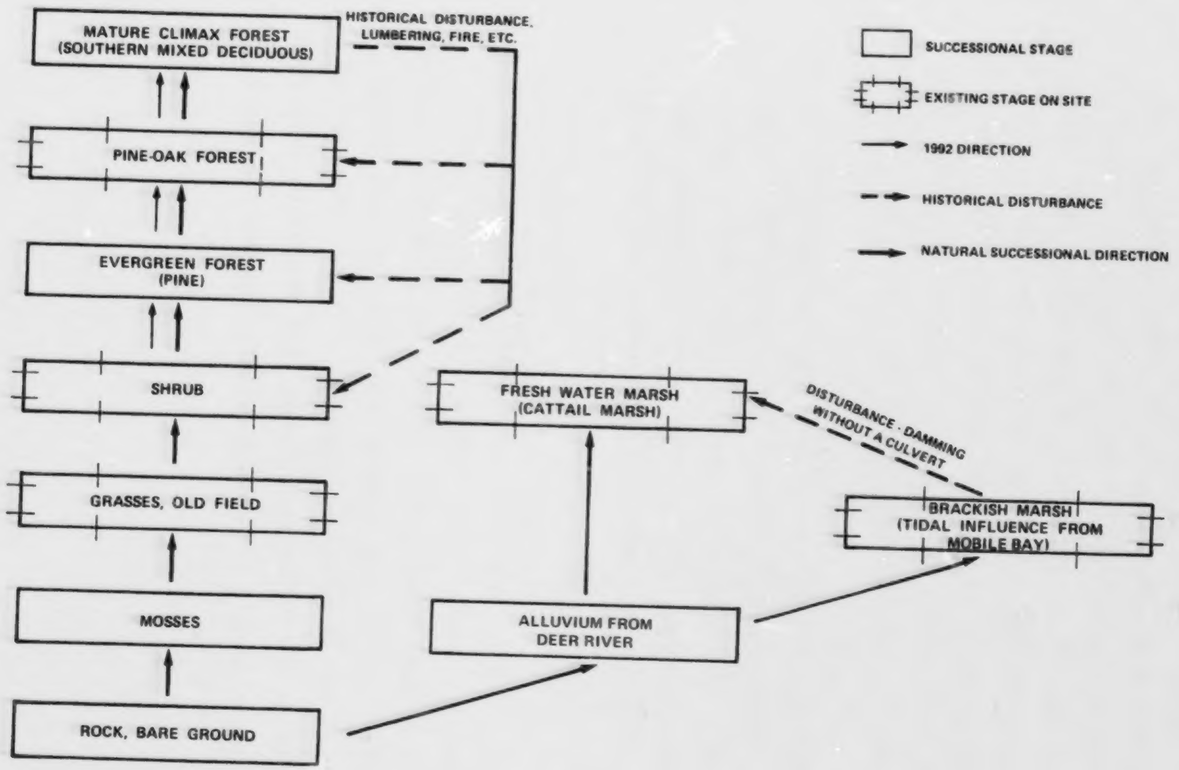
Hunting, particularly for quail, rabbit, and dove, occurs on the site. Prior to lumbering, significant red squirrel populations were present (Athens, 1977). There is some fishing for mullet and trout along the barge canal. In general, the site is not considered a major hunting and fishing area, although local residents do use the site to some extent.

PROJECTED 1992 ENVIRONMENT

Assuming no change from current conditions. the forest at the site should develop into a southern mixed deciduous forest within a 140- to 170-year period. Figure B.E.5 presents general plant succession and indicates the 1992 direction. Currently. the understory is dense; but competition would thin the existing trees to a stable density. The open areas would require considerably more time to reach this stage since it would first take 80 to 85 years for a pine forest to develop. The pine forest would probably last for 40 to 50 years, assuming no fires. and ultimately develop into a southern mixed deciduous forest.

As succession proceeds. the insectivorous and fructivorous birds will increase. as well as the omnivorous birds. With the increase in pine and oaks, squirrels will increase in numbers, whereas rabbits will decrease somewhat with the reduction in the understory plants. The generalized pattern of bird and mammal succession is presented in Figure B.E.6.

The marsh is a relatively stable system, and little change is expected in either plant or animal communities. However, marsh areas, and especially bogs, will become somwhat smaller because of gradual filling with organic material. The filling process should occur more slowly in the marsh since much of the material is exported from it. Streamflow patterns and some species densities may change, but the basic structure and function of the marsh should not change within the next 15 years.



MATURE CLIMAX FOREST (SOUTHERN MIXED DECIDUOUS)
HISTORICAL DISTURBANCE, LUMBERING, FIRE, ETC.
PINE-OAK FOREST
EVERGREEN FOREST (PINE)
SHRUB
GRASSES, OLD FIELD
MOSSES
ROCK, BARE GROUND
FRESH WATER MARSH (CATTAIL MARSH)
ALLUVIUM FROM DEER RIVER
DISTURBANCE - DAMMING WITHOUT A CULVERT
BRACKISH MARSH (TIDAL INFLUENCE FROM MOBILE BAY)
SUCCESSIONAL STAGE
EXISTING STAGE ON SITE
1992 DIRECTION
HISTORICAL DISTURBANCE
NATURAL SUCCESSIONAL DIRECTION

Figure B.E.5
GENERAL PLANT SUCCESSION AND 1992 BASELINE CONDITIONS OF THE PROPOSED PLANT SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

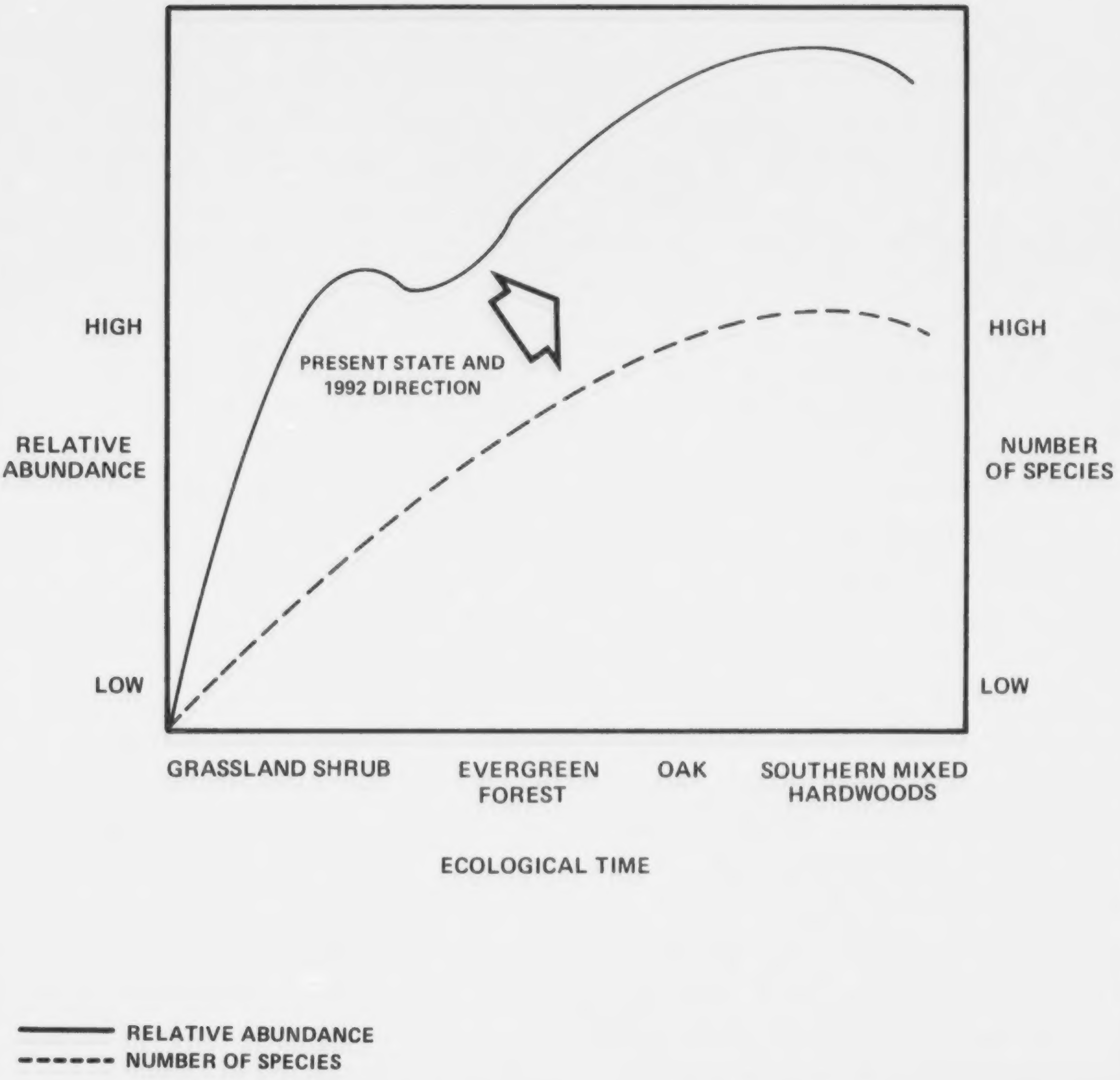


Figure B.E.6
GENERALIZED PATTERN OF BIRD AND MAMMAL SUCCESSION IN SOUTHEASTERN FORESTS
(Adapted from Johnston and Odum, 1956; Hirth, 1959)

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

ECOSYSTEM ANALYSIS--QUARRY SITE

EXISTING ENVIRONMENT (1977)

Ecological Structure

Plant Communities

There are five major vegetational communities currently existing on the proposed quarry site: (1) improved pasture and cropland, (2) remnant forests, (3) floodplain forest, (4) pine-hardwood forest, and (5) hardwood bottomlands. The extent of these communities is depicted in Figure B.E.7, and photographs of vegetational areas 1, 2, and 3 are presented in Figure B.E.8. Table B.E.3 lists the plants occurring on the site.

"Improved pastureland" includes cropland, silage, and pasture. Many weedy species at the perimeters of these areas may provide food and cover for wildlife. In the past, much of the quarry site reportedly was cultivated for food crops. Some of this land was later abandoned and eventually developed second growth loblolly and slash pine. Other parcels converted to pastureland are now planted in bahia grass. Between 1968 and 1974, 36 hectares (90 acres) were planted in chufa and partridge pea to provide food for wildlife.

Disturbed, remnant forests are generally surrounded by pastureland and are used by livestock, which compact the soil and increase the nutrient load by their wastes. Because of grazing, early successional plants do not reach expected size or numbers.

The floodplain is small on the eastern bank of the Alabama River, and regulation of water level by dams makes heavy flooding relatively rare. Perhaps because of this regulation, no intermediate age classes of cypress are found on the site. A few seedlings were found near the mouth of Hollinger Creek, but otherwise only mature cypress occur along Hollinger and Randons creeks. The remainder of the floodplain forest (see Figure B.E.7) is dominated by silver maple, gum, hickories and ash. Other plants include reed, red maple, titi, and cliftonia.

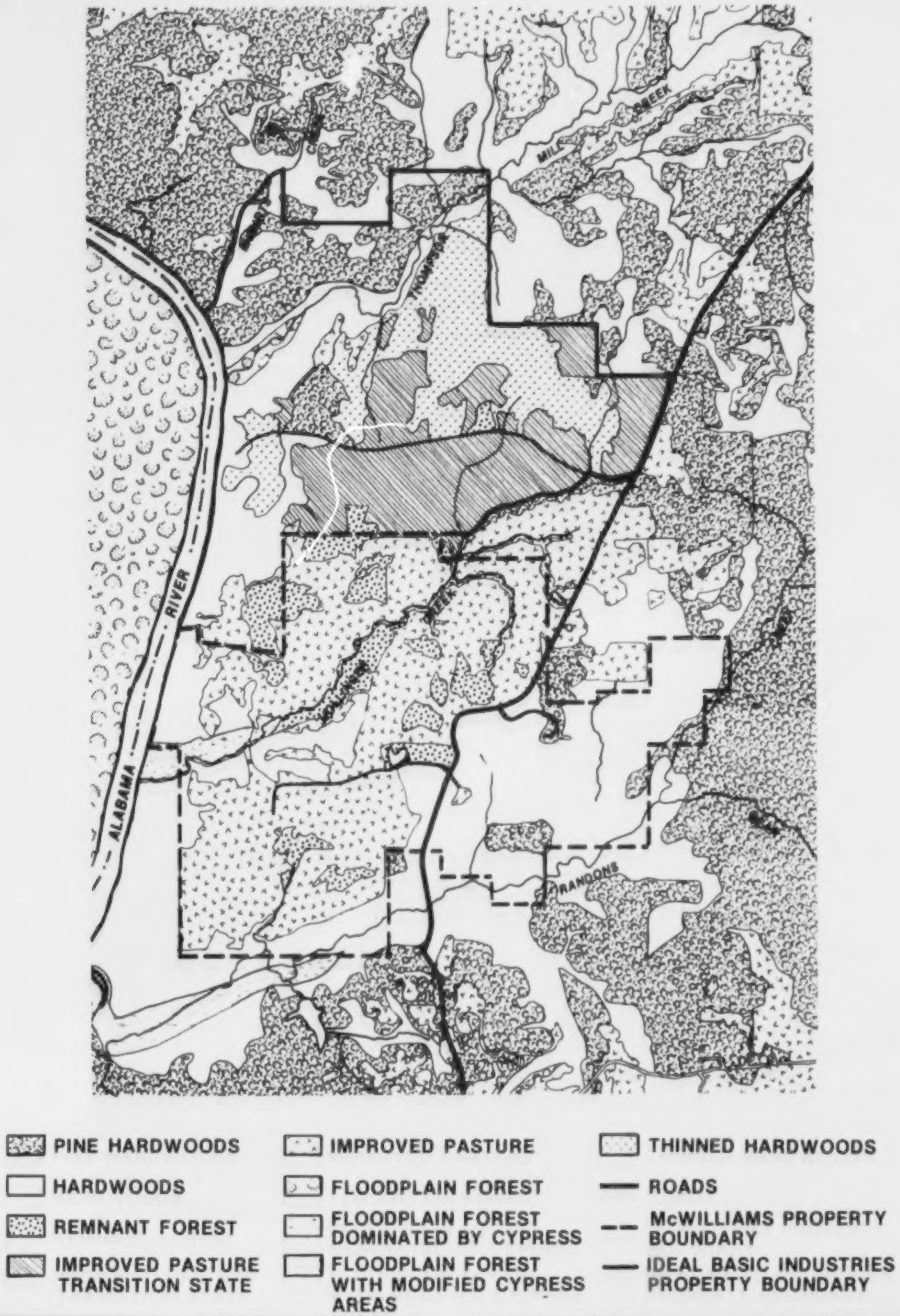

MILL CREEK
THOMPSON
ALABAMA RIVER
RANDONS
▨ PINE HARDWOODS
☐ HARDWOODS
▨ REMNANT FOREST
▨ IMPROVED PASTURE TRANSITION STATE
☐ IMPROVED PASTURE
☐ FLOODPLAIN FOREST
☐ FLOODPLAIN FOREST DOMINATED BY CYPRESS
☐ FLOODPLAIN FOREST WITH MODIFIED CYPRESS AREAS
☐ THINNED HARDWOODS
— ROADS
-- McWILLIAMS PROPERTY BOUNDARY
— IDEAL BASIC INDUSTRIES PROPERTY BOUNDARY

Figure B.E.7
VEGETATION MAP OF THE PROPOSED QUARRY SITE

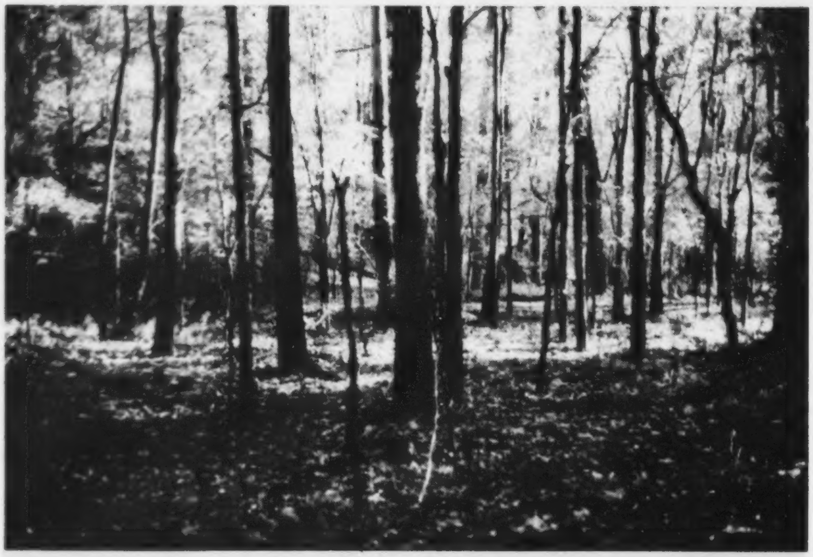
0 0.5 1
SCALE IN KILOMETERS

N

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA



FLOODPLAIN FOREST (HOLLINGER CREEK)

IMPROVED PASTURE AND REMNANT FOREST

Figure B.E.8·
PHOTOGRAPHS OF VEGETATIONAL AREAS

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

Table B.E.3. List of Plants Occurring on the Proposed Quarry Site, Monroe County

Scientific Name	Common Name
Woody Plants	
Aesculus pavia	Buckeye
Acer leucoderme	Chalk Maple
Acer regundo	Box Elder
Acer rubrum	Red Maple
Acer saccharinum	Silver Maple
Aralia spinosa	Devil's Walkingstick
Carpinus caroliniana	Hop Hornbeam
Carya cordiformis	Bitternut Hickory
Carya ovata	Shagbark Hickory
Carya tomentosa	Mockernut Hickory
Celtis laevigata	Hackberry
Cephalanthus occidentalis	Buttonbush
Cliftonia monophylla	Cliftonia
Cornus florida	Dogwood
Cornus alterniflora	Alternate-leaf Dogwood
Cyrilla racemiflora	Titi
Diospyros virginiana	Persimmon
Fagus grandiflora	Beech
Fraxinus americana	American Ash
Gleditsia aquatica	Water Locust
Ilex opaca	American Holly
Juglans nigra	Black Walnut
Juniperus silicicola	Southern Red Cedar
Liquidambar styraciflua	Sweetgum
Liriodendron tulipifera	Yellow Poplar
Magnolia grandiflora	Bull Bay
Magnolia virginiana	Sweet Bay
Melia azedarach	China Berry
Nyssa sylvatica	Black Gum
Ostrya virginiana	Hop Hornbeam
Pinus echinata	Short-leaf Pine
Pinus elliotii	Slash Pine
Pinus taeda	Loblolly Pine
Platanus occidentalis	Sycamore
Prunus serotina	Black Cherry
Quercus alba	White Oak
Quercus falcata	Spanish Oak
Quercus hemisphaerica	--
Quercus laevis	Turkey Oak
Quercus laurifolia	Laurel Oak
Quercus marilandica	Blackjack Oak
Quercus muehlenbergii	Yellow Chestnut Oak
Quercus nigra	Water Oak
Quercus rubra	Red Oak
Quercus stellata	Post Oak

Table B.E.3. List of Plants Occurring on the Proposed Quarry Site, Monroe County (Continued)

Scientific Name	Common Name
Woody Plants	
Salix nigra	Black Willow
Taxodium distichum	Bald Cypress
Tilia americana	Redbud
Ulmus americana	American Elm
Vaccinium arboreum	Blueberry
Herbaceous Plants	
Ampelopsis arborea	Pepper vine
Arundinaria gigantea	Cane
Asclepias lanceolata	Milkweed
Asplenium platyneuron	Ebony Spleenwort
Boehmaria cylindrica	False Nettle
Callicarpa americana	French Mullberry
Campsis radicans	Trumpet Vine
Cercis canadensis	Redbud
Clethra alnifolia	White Alder
Commelina spp.	Day Flower
Chidoscolus stimulosus	Bull Nettle
Cyperus spp.	Sedge
Euonymus americanus	Strawberry Bush
Eupatorium rotundifolium	Thoroughwort
Duchesnia indica	Mock Strawberry
Euonymus americanus	Strawberry Bush
Eupatorium album	Thoroughwort
Eupatorium capillifolium	Dogfennel
Eupatorium rotundifolium	Thoroughwort
Hexastylis sp.	Wild Ginger
Hypericum stans	St. Peter's Wort
Ipomoea purpurea	Common Morning Glory
Ipomoea sagittata	--
Liatris graminifolia	Blazing Star
Lonicera japonica	Japanese Honeysuckle
Panicum anceps	Panic Grass
Panicum ssp.	Panic Grass
Parthenocissus quinquefolia	Virginia Creeper
Phytolacca americana	Pokeweed
Plantago spp.	Plantain
Polygonatum ssp.	Solomon's Seal
Polystichum acrostichoides	Christmas Fern
Rhexia alifanus	Meadow Beauty
Rhus radicans	Poison Ivy

Table B.E.3. List of Plants Occurring on the Proposed Quarry Site, Monroe County (Continued)

Scientific Name	Common Name
Herbaceous Plants	
Rubus betulifolius	Blackberry
Sabatia calycina	Sabatia
Saururus cernuus	Lizard's Tail
Screnoa repens	Saw Palmetto
Smilax spp.	Greenbrier
Solidago sempervirens	Goldenrod
Solidago spp.	Goldenrod
Strophostyles umbellata	--
Viola sp.	Violet
Vitis aestivalis	Summer Grape
Vitis rotundifolia	Muscadine

Source: Environmental Science and Engineering, Inc., 1977.

Almost all of the pine-hardwood forest and bottomland hardwoods on the site have been modified. For example, from 1968 to 1974, 634 hectares (1,566 acres) of the total 1,633 hectares (4,035 acres) were managed, and 1,300 pine trees per year were removed. Pine-hardwood forest of the uplands was thinned to favor pines, and cypress and the larger commercially important hardwoods were taken from the bottomland hardwoods, thus favoring yellow poplar, ash, gum, and various hardwoods. Many of the forested areas are currently grazed by cattle.

The pine-hardwood forest on the uplands typically has a loblolly pine overstory, with cedar and water oak the most common trees (Table B.E.4). Because of frequent disturbances and even clearing in the past, all succession stages from old fields to predominantly hardwoods can be found on the site.

The bottomland hardwoods are typical of the vegetation described by Gemborys and Hodgkins (1971) as "branch-bottoms." The mesic areas generally contain oak saplings, basswood, hackberry, dogwood, sweet gum, and hickories, with lianas such as grapes and crossvine prevalent in the understory. The more hydric areas contain maple, French mulberry, and cane. Ground cover in the bottomlands includes pepper vine, Virginia creeper, poison ivy, greenbrier, Japanese honeysuckle, oak seedlings, mushrooms, and mosses, with various grasses also important in open areas.

Along the river bluffs there are microhabitats characterized by cooler air, higher humidity, and lower illumination. These areas support luxuriant growths of a variety of ferns and may offer habitats for some specialized plants.

Animal Communities

The lower coastal plain, as defined by Imhof (1976), includes the quarry site and contains a lower diversity of vertebrate animals than the Gulf Coast areas of Alabama. The major factor in determining the structure of the animal community at the quarry site is the plant community type.

Table B.E.4 Quantitative Characteristics of Overstory Plants at the Quarry Site

Species	Importance	Relative Dominance (Percent)	Density/ Acre
Quercus nigra	13.43	17.62	20.95
Liquidambar styraciflua	12.33	11.70	24.38
Carpinus caroliniana	4.40	2.13	9.52
Platanus occidentalis	4.40	8.31	4.19
Juniperus silicicola	4.19	2.00	9.14
Ulmus americana var. *americana*	4.07	2.78	7.24
Fagus grandiflora	3.82	5.19	4.95
Pinus taeda	3.81	4.80	6.10
Celtis laevigata	3.24	1.95	6.48
Quercus stellata	3.20	2.53	6.86
Quercus hemisphaerica	2.75	4.64	3.05
Tilia americana	2.71	1.64	5.33
Carya tomentosa	2.58	1.78	4.95
Fraxinus americana	2.42	3.04	3.05
Juglans nigra	2.36	3.68	2.67
Aesclulus pavia	2.32	3.33	3.05
Ilex opaca	2.10	1.32	3.81
Nyssa sylvatica	1.80	0.94	3.43
Liriodendron tulipifera	1.68	1.58	3.81
Acer rubrum	1.65	1.25	2.67
Acer negundo	1.58	0.82	3.05
Quercus laevis	1.37	1.47	1.90
Taxodium distichum	1.37	1.25	2.29
Quercus rubra	1.28	1.72	1.52
Quercus laurifolia	1.27	1.55	2.29
Cornus alterniflora	1.07	0.35	2.29
Magnolia grandiflora	1.06	1.14	1.90
Acer leucoderme	1.06	0.53	1.90
Carya sp.	1.05	1.12	1.90
Pinus elliottii	1.02	0.95	1.52
Acer saccharinum	0.99	0.86	1.52
Quercus falcata	0.95	0.52	1.90
Quercus muehlenbergii	0.93	0.98	1.52
Carya cordiformis	0.89	0.55	1.52
Ostrya virginiana	0.82	0.33	1.52
Quercus marilandica	0.77	1.77	0.38
Pinus echinata	0.53	0.32	1.14
Carya ovata	0.44	0.80	0.38
Robinia pseudoacacia	0.39	0.12	0.76

Table B.E.4 Quantitative Characteristics of Overstory Plants at the Quarry Site (Continued)

Species	Importance	Relative Dominance (Percent)	Density/ Acre
Quercus virginiana	0.37	0.06	0.76
Diospyros virginiana	0.33	0.24	0.76
Pinus glabra	0.22	0.12	0.38
Melia azederach	0.20	0.06	0.38
Lindera benzoin	0.19	0.03	0.38
Fraxinus caroliniana	0.19	0.05	0.38
Prunus serotina	0.19	0.05	0.38
Vaccinium arboreum	0.19	0.05	0.38

Source: Environmental Science and Engineering, Inc., 1977.

Five plant communities have been identified; however, the presence of forest or pasture vegetation is the primary determinant of the presence or absence of various animal groups. The other major factors influencing the diversity of the quarry site are its inland location, large geographical area, and isolation from human activity. Table B.E.5 lists the major species of vertebrates known or expected to occur in the vicinity of the proposed quarry site.

Many of the animals inhabiting forested areas of the proposed quarry site are the same as those found in the forested areas of the plant site. The forests of the quarry site support a large number of squirrels and are characterized by the presence of deer and wild turkey. The hardwood bottomlands and floodplain forest of the quarry site contain barred owls, hooded warblers, southeastern shrews, cottonmouths, southern dusky salamanders, and pickerel frogs, which are not present at the plant site. Extensive and active beaver dams were found in the lower reaches of Hollinger Creek.

The faunal differences at the quarry site are indicative of open versus closed habitats rather than of specific vegetation types. The characteristic exclusives of the forested (closed) areas are warblers, chickadees, woodpeckers, squirrels, tree frogs, and skinks.

The pasture and cultivated fields of the quarry site are characterized by cattle, songbirds, cattle egrets, cotton rats, and mice. Deer, quail, mourning dove, and turkey also frequent these open areas. The number of exclusive species (e.g., the meadowlark) are few.

Table B.E.5. Listing and Preferred Habitats of Vertbrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Caudata										
Ambystomatidae										
Ambystoma maculatum	Spotted salamander			X	X			X	X	
Ambystoma talpoideum	Mole salamander			X	X			X	X	
Ambystoma tigrinum trio[illegible]um	Tiger salamander			X	X			X		
Salamandridae										
Notophthalamus viridescens louisianensis	Central Newt							X	X	
Plethodontidae										
Desmognathus auriculatus	Southern dusky salamander	X		X	X				X	
Pseudotriton montanus	Mud salamander				X				X	
Plethodon glutinosus	Slimy salamander	X	X	X	X					
Eurycea bislineata	Two-lined salamander			X	X			X	X	
Amphiumidae										
Amphiuma means means	Two-toed congo eel			X	X			X	X	
Necturidae										
Necturus punctatus	Southern mud puppy						X	X		
Anura										
Pelobatidae										
Scaphiopus holbrooki	Eastern spadefoot toad		X	X	X					
Ranidae										
Rana catesbeiana	Bullfrog	X						X	X	
Rana clamitans	Bronze frog	X		X	X			X	X	
Rana palustris	Pickerel frog		X			X		X		
Rana utricularia	southern leopard frog	X		X				X	X	X
Microhylidae										
Gastrophryne carolinensis	Eastern narrow-mouth toad	X	X	X	X					
Bufonidae										
Bufo quercicus	Oak toad	X	X	X				X	X	
Bufo terrestris terrestris	Southern toad	X		X				X		
Bufo woodhousei fowleri	Fowlers toad	X	X	X	X	X	X	X	X	X
Hylidae										
Acris gryllus gryllus	Southern cricket frog	X			X		X	X	X	
Hyla crucifer crucifer	Northern spring peeper	X		X	X			X		
Hyla cinerea cinerea	Green treefrog	X						X	X	
Hyla femoralis	Pine woods treefrog		X	X	X			X		
Hyla gratiosa	Barking treefrog		X	X	X			X		
Hyla squirella	Squirrel treefrog		X					X		X
Hyla [illegible]icolor	Gray treefrog	X	X	X	X			X		
Pseudacris nigrita nigrita	Southern chorus frog		X	X	X					
Pseudacris ornata	Ornate chorus frog	X	X							
Testudines										
Chelydridae										
Chelyolra serpentina serpentina	Snapping turtle	X					X	X		
Kinosternidae										
Stenotherus odoratus	Musk turtle						X	X	X	
Stenotherus minor	Loggerhead musk turtle						X	X	X	
Kinosternon subrubrum subrubrum	Common mud turtle							X		
Emydidae										
Terrapene carolina triunguis	Three-toed box turtle	X	X	X	X	X				X

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Emydidae (continued)										
Chrysemys floridana	Florida cooter						X	X		
Chrysemys scripta	Yellow-bellied turtle						X	X		
Deirochelys reticularia	Chicken turtle							X		
Testudinidae										
Gopherus polyphemus	Gopher tortoise		X	X		X				
Trionychidae										
Trionyx muticus calvatus	Gulf coast smooth softshell						X		X	
Trionyx spiniferus	Gulf coast spiny softshell						X		X	
Crocodylia										
Alligatoridae										
Alligator mississippiensis	American alligator						X	X	X	
Squamata										
Iguanidae										
Anolis carolinensis	Green anole	X	X	X						
Sceloporus undulatus	Fence lizard	X	X	X		X				
Scincidae										
Leiolopisma laterale	Ground skink	X	X	X						
Eumeces anthracinus pluvialis	Southern coal skink		X	X						
Eumeces fasciatus	Five-lined skink	X	X	X						
Eumeces laticeps	Broad-headed skink			X						
Eumeces inexpectatus	Southeastern five-lined skink		X	X						
Teiidae										
Cnemidophorus sexlineatus	Six-lined racerunner	X	X	X		X				
Anguidae										
Ophisaurus ventralis	Eastern glass lizard					X				
Ophisaurus longicauda	Slender glass lizard					X				
Colubridae										
Natrix fasciata fasciata	Banded water snake						X	X	X	
Natrix erythrogaster flavigaster	Yellow-bellied water snake						X	X	X	
Natrix rigida	Glossy water snake						X	X	X	
Natrix rhombifera rhombifera	Diamond-backed water snake						X	X	X	
Natrix septemvittata	Queen snake						X		X	
Tantilla cornata	Southeastern crowned snake		X							
Seminatrix pygaea	Black swamp snake						X			
Thamnophis sirtalis	Garter snake	X		X	X	X				
Thamnophis sauritus	Ribbon snake				X			X	X	
Virginia stritula	Rough earth snake			X	X					
Virginia valeriae	Smooth earth snake			X	X					
Storeria occipitomaculata	Red-bellied snake			X	X					
Storeria dekayi	Brown snake			X	X					
Heterodon platyrhinos	Eastern hognose snake		X	X	X	X				
Heterodon simus	Southern hognose snake		X	X	X	X				
Diadophis punctatus	Ringneck snake			X	X					
Farancia erytrogramma	Rainbow snake				X					
Farancia abacura	Mud snake				X					
Coluber constrictor	Black racer	X	X	X		X				
Masticophis flagellum	Eastern coachwhip		X	X						
Opheodrys aestivus	Rough green snake			X	X					

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quoposed Qarry Site, Monroe County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Colubridae (continued)										
Elaphe guttata guttata	Corn snake		X	X	X					X
Elaphe obsoleta	Gray rat snake	X	X	X						X
Pituophus melanoleucus mugitus	Southern pine snake		X							
Drymarchon corais couperi	Indigo snake		X							
Lampropeltis calligaster	Mole kingsnake	X	X	X						
Lampropeltis getulus	Speckled eastern kingsnake		X	X						
Lampropeltis triangulum elapsoides	Scarlet kingsnake		X	X						
Cemophora coccinea	Scarlet snake		X	X						
Elapidae										
Micrurus fulvius fulvius	Eastern coral snake			X	X					
Viperidae										
Agkistrodon contortrix	Southern copperhead	X	X	X	X					X
Agkistrodon piscivorus conanti	Florida cottonmouth	X					X	X	X	
Sistrurus miliarius barbouri	Dusky pigmy rattlesnake		X	X		X				
Crotalus horridus atricaudatus	Canebrake rattlesnake	X		X	X					
Crotalus adamanteus	Eastern diamondback rattlesnake		X							

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Gaviiformes											
Gavia immer	Common loon							X	X		
Podicipediformes											
Podiceps podilymbus	Pied-billed grebe		X						X		
Pelecaniformes											
Pelecanus erythrorhynchos	White pelican							X	X		
Phalacrocorax auritus	Double-crested cormorant							X			
Anhinga anhinga	Anhinga								X	X	
Ciconiiformes											
Ardea herodias	Great blue heron		X						X		
Butorides striatus	Green heron	X	X						X		
Florida caerulea	Little blue heron		X						X		
Bubulcus ibis	Cattle egret	X	X				X				
Casmerodius albus	Great egret							X	X	X	
Egretta thula	Snowy egret	X	X						X		
Hydranassa tricolor	Louisiana heron	X	X				X		X		
Nyctanassa violacea	Yellow-crowned night heron	X									
Ixobrychus exilis	Least bittern								X		
Botarus lentiginosus	American bittern								X		
Mycteria americana	Wood stork	X				X					
Plegadis falcinellus	Glossy ibis								X		
Eudocimus albus	White ibis								X		
Anseriformes											
Branta canadensis	Canada goose						X		X		
Dendrocygna bicolor	Fulvous whistling duck								X		
Anas platyrhynchos	Mallard		X		X			X	X		
Anas rubripes	Black duck		X		X			X	X		
Anas strepera	Gadwall								X		
Anas acuta	Pintail								X		
Anas crecca carolinensis	Green-winged teal								X		
Anas discors	Blue-winged teal		X						X		
Anas americana	American widgeon						X		X		

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Anseriformes (continued)											
Anas clypeata	Northern shoveler								X		
Aix sponsa	Wood duck		X		X	X			X		
Aytha americana	Redhead							X	X		
Aytha collaris	Ring-necked duck							X	X		
Aytha valisineria	Canvasback							X	X		
Aytha marila	Greater scaup							X	X		
Aytha affinis	Lesser scaup							X	X		
Bucephala clangula	Common goldeneye							X	X		
Bucephala albeola	Bufflehead							X	X		
Clangula hyemalis	Oldsquaw							X	X		
Somateria spectabilis	King eider							X	X		
Melanitta deglandi	White-winged scoter							X	X		
Melanitta perspicillata	Surf scoter							X	X		
Melanitta nigra	Black scoter							X	X		
Oxyura jamaicensis	Ruddy duck								X		
Lophodytes cucullatus	Hooded merganser		X						X		
Mergus serrator	Red-breasted merganser								X	X	
Falconiformes											
Cathartes aura	Turkey vulture		X	X	X	X	X	X	X	X	X
Coragyps atratus	Black vulture	X	X	X	X	X	X	X	X	X	X
Elanoides forficatus	Swallow-tailed kite		X				X				
Ictinia misisippiensis	Mississippi kite	X	X		X		X				
Accipiter striatus	Sharp-shinned hawk		X	X	X	X	X	X	X	X	X
Accipiter cooperii	Cooper's hawk		X		X	X	X				
Buteo jamaicensis	Red-tailed hawk	X	X	X							
Buteo lineatus	Red-shouldered hawk	X	X	X							
Buteo platypterus	Broad-winged hawk		X	X							
Buteo lagopus	Rough-legged hawk						X				
Haliaeetus leucocephalus	Bald eagle							X			
Aquila chrysaetos	Golden eagle			X	X						
Circus cyaneus	Marsh hawk			X	X	X	X	X	X	X	X
Pandion haliaetus	Osprey							X			
Falco peregrinus	Peregrine falcon								X	X	
Falco columbarius	Merlin							X	X	X	X
Falco sparverius	American kestrel	X	X	X			X				
Galliformes											
Colinus virginianus	Bobwhite	X	X	X			X				
Meleagris gallopavo	Turkey	X	X	X		X	X				
Gruiformes											
Rallus elegans	King rail							X	X		
Rallus limicola	Virginia rail							X	X		
Porzana carolina	Sora							X	X		
Fulica americana	American coot		X						X		
Charadriiformes											
Charadrius vociferus	Killdeer	X	X				X		X		
Pluvialis dominica	American golden plover						X				
Philohela minor	American woodcock		X		X	X			X		
Actitis macularia	Spotted sandpiper							X	X		
Tringa solitaria	Solitary sandpiper							X	X		
Calidris melanotos	Pectoral sandpiper							X	X		

Table B.E.5. Listing and Preferred Habitat of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Charadriiformes (continued)											
Larus argentatus	Herring gull							X			
Larus delawarensis	Ring-billed gull								X		
Columbiformes											
Columba livia	Rock dove	X	X	X	X	X	X	X	X	X	X
Zenaida macroura	Mourning dove	X	X	X	X	X	X	X	X	X	X
Columbina passerina	Ground dove	X	X								X
Cuculiformes											
Coccyzus americanus	Yellow-billed cuckoo	X	X	X							
Coccyzus erythropthalmus	Black-billed cuckoo		X	X							
Strigiformes											
Tyto alba	Barn owl		X				X				
Otus asio	Screech owl		X	X	X	X					
Bubo virginianus	Great horned owl	X	X	X	X	X	X	X	X	X	X
Nyctea scandiaga	Snowy owl						X				
Strix varia	Barred owl	X	X	X	X	X	X	X	X	X	X
Asio otus	Long-eared owl			X							
Asio flammeus	Short-eared owl						X				
Aegolius acadicus	Saw-whet owl				X						
aprimulgiformes											
Caprimulgus carolinensis	Chuck-will's widow	X	X	X	X	X					
Caprimulgus vociferus	Whip-poor-will		X	X	X	X					
Chordeiles minor	Common nighthawk	X	X				X				X
Apodiformes											
Archilochus colubris	Ruby-throated hummingbird		X	X	X	X					
Coraciiformes											
Megaceryle alcyon	Belted kingfisher	X	X					X			
Piciformes											
Colaptes auratus	Common flicker	X	X	X	X	X					
Dryocopus pileatus	Pileated woodpecker	X	X	X	X	X					
Centurus carolinus	Red-bellied woodpecker	X	X	X	X	X					
Melanerpes erythrocephalus	Red-headed woodpecker	X	X	X	X	X					
Sphyrapicus varius	Yellow-bellied sapsucker			X	X	X					
Picoides villous	Hairy woodpecker	X	X	X	X	X					
Picoides pubescens	Downy woodpecker	X	X	X	X						
Picoides borealis	Red-cockaded woodpecker			X							
Passeriformes											
Tyrannus tyrannus	Eastern kingbird		X	X			X				
Tyrannus verticalis	Western kingbird						X				
Myiarchus crinitus	Great crested flycatcher	X	X	X		X					
Empidonax virescens	Acadian flycatcher		X	X	X	X					
Contopus virens	Eastern wood pewee		X	X	X	X					
Iridoprocne bicolor	Tree swallow							X	X		
Riparia riparia	Bank swallow							X			
Stelgidopteryx ruficollis	Rough-winged swallow	X	X				X	X	X		
Hirundo rustica	Barn swallow		X				X		X		
Petrochelidon pyrrhonota	Cliff swallow		X				X		X		
Progne subis	Purple martin	X	X				X	X			
Cyanocitta cristata	Blue jay	X	X	X	X	X	X	X	X	X	X
Corvus brachyrhynchos	Common crow	X	X	X			X	X			
Parus carolinensis	Carolina chickadee		X	X	X	X					
Parus bicolor	Tufted titmouse	X	X	X	X	X					

Table B.E.5. Listing and Preferred Habitat of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Passeriformes (continued)											
Sitta canadensis	Red-breasted nuthatch			X							
Sitta pusilla	Brown-headed nuthatch		X	X							
Certhia familiaris	Brown creeper			X	X	X					
Troglodytes aedon	House wren				X						
Troglodytes troglodytes	Winter wren				X	X					
Thryothorus ludovicianus	Carolina wren	X	X	X	X	X	X	X	X	X	X
Cistothorus palustris	Long-billed marsh wren							X	X		
Cistothorus platensis	Short-billed marsh wren						X		X		
Minus polyglottos	Mockingbird	X	X	X		X	X				
Dumetella carolinensis	Gray catbird		X	X			X				
Toxostoma rufum	Brown thrasher	X	X	X			X				
Turdus migratorius	American robin	X	X	X	X	X	X	X	X	X	X
Catharus guttatus	Hermit thrush			X	X	X		X	X	X	
Catharus ustulatus	Swainson's thrush			X	X	X		X	X	X	
Catharus minimus	Gray-cheeked thrush			X	X	X		X	X	X	
Catharus fuscescens	Veery			X	X	X		X	X	X	
Hylocichla mustelina	Wood thrush	X	X	X	X	X		X	X	X	
Sialia sialis	Eastern bluebird	X	X	X		X	X				
Polioptila caerulea	Blue-gray gnatcatcher	X	X	X							
Regulus satrapa	Golden-crowned kinglet			X	X	X					
Regulus calendula	Ruby-crowned kinglet			X	X	X					
Anthus spinoletta	Water pipit						X				
Bombycilla cedrorum	Cedar waxwing	X	X	X							
Lanius ludovicianus	Loggerhead shrike	X	X	X			X				
Sturvus vulgaris	Starling	X	X	X							
Vireo griseus	White-eyed vireo	X	X	X	X	X					
Vireo flavifrons	Yellow-throat vireo		X	X							
Vireo solitarius	Solitary vireo		?	X							
Vireo olivaceus	Red-eyed vireo	X	X	X							
Vireo philadelphicus	Philadelphia vireo			X							
Mniotilta varia	Black and white warbler	X	X	X							
Protonotaria citrea	Prothonotary warbler	X	X		X	X					
Limnothlypis swainsonii	Swainson's warbler				X	X					
Helmitheros vermivorus	Worm-eating warbler			X	X						
Vermivora chrysoptera	Golden-winged warbler			X			X				
Vermivora pinus	Blue-winged warbler						X				
Vermivora bachmanii	Bachman's warbler				X	X					
Vermivora peregrina	Tennessee warbler			X	X	X					
Vermivora celata	Orange-crowned warbler			X	X	X					
Parula americana	Northern parula	X	X	X	X	X					
Dendroica petechia	Yellow warbler							X		X	
Dendroica magnolia	Magnolia warbler			X	X	X					
Dendroica coronata	Yellow-rumped warbler			X	X						
Dendroica virens	Black-throated green warbler			X	X						
Dendroica deminica	Yellow-throated warbler		X	X							
Dendroica pensylvanica	Chestnut-sided warbler		?	X							
Dendroica striata	Blackpoll warbler			X	X	X					
Dendroica pinus	Pine warbler		X	X							
Dendroica castanea	Bay-breasted warbler			X	X						
Dendroica discolor	Prairie warbler		X	X			X				
Dendroica palmarum	Palm warbler		X	X							

Table B.E.5. Listing and Preferred Habitat of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Species	Common Name	Observed	Breeding Species	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Passeriformes (continued)											
Seiurus aurocapillus	Ovenbird		X	X							
Seiurus noveboracensis	Northern waterthrush								X	X	
Seiurus motacilla	Louisiana waterthrush	X	X			X				X	
Oporornis formosus	Kentucky warbler		X		X						
Geothlypis trichas	Common yellowthroat						X				
Icteria virens	Yellow-breasted chat		X	X							
Wilsonia citrina	Hooded warbler	X	X		X						
Setophaga ruticilla	American redstart		X		X	X					
Passer domesticus	House sparrow	X	X								X
Dolichonyx oryzivorus	Bobolink						X				
Sturnella magna	Eastern meadowlark	X	X				X				
Agelaius pheoniceus	Redwing blackbird	X	X						X		
Icterus spurius	Orchard oriole		X	X							
Icterus galbula	Northern oriole	X	X								X
Euphagus carolinus	Rusty blackbird						X		X		
Euphagus cyanocephalus	Brewer's blackbird						X				
Quiscalus quiscula	Common grackle	X	X	X							
Molothrus ater	Brown-headed cowbird		X				X				
Piranga rubra	Summer tanager	X	X	X	X						
Cardinalis cardinalis	Cardinal	X	X	X							
Guiraca caerulea	Blue grosbeak		X	X			X				
Passerina cyanea	Indigo bunting		X	X			X				
Passerina ciris	Painted bunting		X	X			X				
Hesperiphona vespertina	Evening grosbeak			X							
Carpodacus purpureus	Purple finch			X	X	X					
Phecticus ludovicianus	Rose-breasted grosbeak			X	X	X					
Spiza americana	Dickcissel		X				X				
Pipilo erythrophthalmus	Rufous-sided towhee	X	X	X	X						
Passerculus sandvicensis sandvicensis	Savannah sparrow						X				
Ammodramus savannarum	Grasshopper sparrow		X				X				
Ammodramus henslowii	Henslow's sparrow						X				
Ammospiza caudacuta	Sharp-tailed swallow						X				
Ammoxpiza leconteii	LeConte's sparrow						X				
Pooecetes gramineus	Vesper sparrow						X				
Aimophila aestivalis	Bachman's sparrow		X	X							
Junco hyemalis hyemalis	Dark-eyed junco										X
Spizella passerina	Chipping sparrow						X				X
Spizella pusilla	Field sparrow		X				X				
Zonotrichia leucophrys	White-crowned sparrow						X				
Zonotrichia albicollis	White-throated sparrow			X	X	X					
Passerella iliaca	Fox sparrow			X	X	X					
Melospiza georgiana	Swamp sparrow								X		
Melospiza melodia	Song sparrow		X				X				

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Marsupialia										
Didelphidae										
Didelphis marsupialis	Opossum	X	X	X	X	X				X
Insectivora										
Soricidae										
Sorex longirostris	Southeastern shrew			X	X	X				
Blarina brevicauda	Shorttail shrew			X	X					
Cryptotis parva	Least shrew					X				
Talpidae										
Scalopus aquaticus	Eastern mole	X	X	X		X				
Chiroptera										
Vespertilionidae										
Myotis austroriparius	Mississippi myotis		X	X	X					X
Myotis lucifugus	Little brown myotis		X	X	X	X	X	X	X	
Pipistrellus subflavas	Eastern pipistrel		X	X	X	X	X	X	X	
Eptesicus fuscus	Big brown bat		X	X	X	X	X	X	X	
Lasiurus borealis	Red bat		X	X	X	X	X	X	X	
Lasiurus seminolus	Seminole bat		X	X	X	X	X	X	X	
Lasiurus intermedius	Yellow bat		X	X	X	X	X	X	X	
Lasiurus cinereus	Hoary bat		X	X	X	X	X	X	X	
Nycticeius humeralis	Evening bat		X	X	X	X	X	X	X	
Plecotus rafinesquei	Big-eared bat		X	X	X	X	X	X	X	
Molossidae										
Tadarida brasiliensis	Mexican freetail bat		X	X	X	X	X	X	X	
Edentata										
Dasypodidae										
Dasypus novemcinctus	Nine-banded armadillo	X	X	X	X	X				
Lagomorpha										
Leporidae										
Sylvilagus floridanus	Eastern cottontail	X	X	X		X		X	X	
Sylvilagus aquaticus	Swamp rabbit	X			X		X	X	X	
Rodentia										
Sciuridae										
Sciurus carolinensis	Gray squirrel	X	X	X	X					
Sciurus niger	Fox squirrel	X	X	X	X					
Glaucomys volans	Southern flying squirrel		X	X	X					
Castoridae										
Castor canadensis	Beaver	X		X	X			X	X	
Cricetidae										
Oryzomys palustris	Rice rat					X		X	X	
Reithrodontomys humulis	Harvest mouse					X		X	X	
Peromyscus leucopus	White-footed mouse	X	X	X	X	X				
Peromyscus gossypinus	Cotton mouse		X	X	X					
Peromyscus nuttalli	Golden mouse		X	X	X					
Sigmodon hispidus	Cotton rat					X		X	X	
Neotoma floridana	Eastern woodrat	X	X	X	X	X				
Pitymys pinetorum	Pine vole		X	X	X					
Muridae										
Rattus norvegicus	Norway rat									X
Rattus rattus	Black rat									X
Mus musculus	House mouse					X				X

Table B.E.5. Listing and Preferred Habitats of Vertebrates Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County (continued)

Order Family Species	Common Name	Observed	Pine Oak Hardwoods	Hardwood Bottomland	Floodplain Forest	Pastures & Fields	Alabama River	Ponds	Streams	Developed
Carnivora										
Canidae										
Vulpes fulva	Red fox		X			X				
Urocyon cinereoargenteus	Gray fox		X	X	X	X				
Canis familiaris	Feral dog		X	X	X	X		X	X	X
Procyonidae										
Procyon lotor	Raccoon		X	X	X	X		X	X	X
Mustelidae										
Mustela frenata	Longtail weasel			X	X	X		X	X	
Mustela vison	Mink			X					X	
Spilogale putorius	Spotted skunk			X	X	X			X	
Lutra canadensis	River otter								X	
Felidae										
Lynx rufus	Bobcat		X	X	X	X		X	X	
Felis catus	Feral cat		X	X	X	X		X	X	X
Artiodactyla										
Cervidae										
Ococoileus virginianus	White-tailed deer		X	X	X	X		X	X	

SOURCE: Environmental Science and Engineering, Inc., 1977

A large number of ubiquitous types, such as crows, foxes, raccoons, shrews, rabbits, and box turtles, are commonly found in both forested and unforested areas. At the interface of the forest and pasture, an edge community provides cover, food, and nesting for a large variety of species. Some wildlife species utilize edges to such an extent that they are not often found in more uniform habitats (Johnston, 1947; Johnston and Odum, 1956). Quail and dove were quite common in the forest edges and remnant forest edges.

Seasonal patterns at the proposed quarry site include spring and fall increases of migratory species of birds and spring and summer increases in all resident populations.

Functional Aspects

Energetics

The productivity of southern mixed hardwood forests is considered in the mid-range for forests (Olson, 1971; Monk, et al., 1970). The productivity of forest systems is proportional to the quantities of annual litterfall. Wells, et al. (1972), found that litterfall for hardwood stands was 25 percent higher than for pine stands. Pine needles accounted for 70 percent of the litterfall in pine stands. Non-woody litter production shows little variability year to year but shows great seasonal variability; woody litter is highly variable from site to site (Sykes and Bunce, 1970). Communities occupying sites of recent logging are in a high net production phase. The older forests are expected to have lower productivity rates because there is a progressive decline in the net production to biomass ratio as succession proceeds.

Cycles

The exchange of nutrients and essential chemical elements between living organisms and inorganic pools is about evenly balanced in most stable ecosystems (see Figure B.E.9). Input of nutrients by an ecosystem

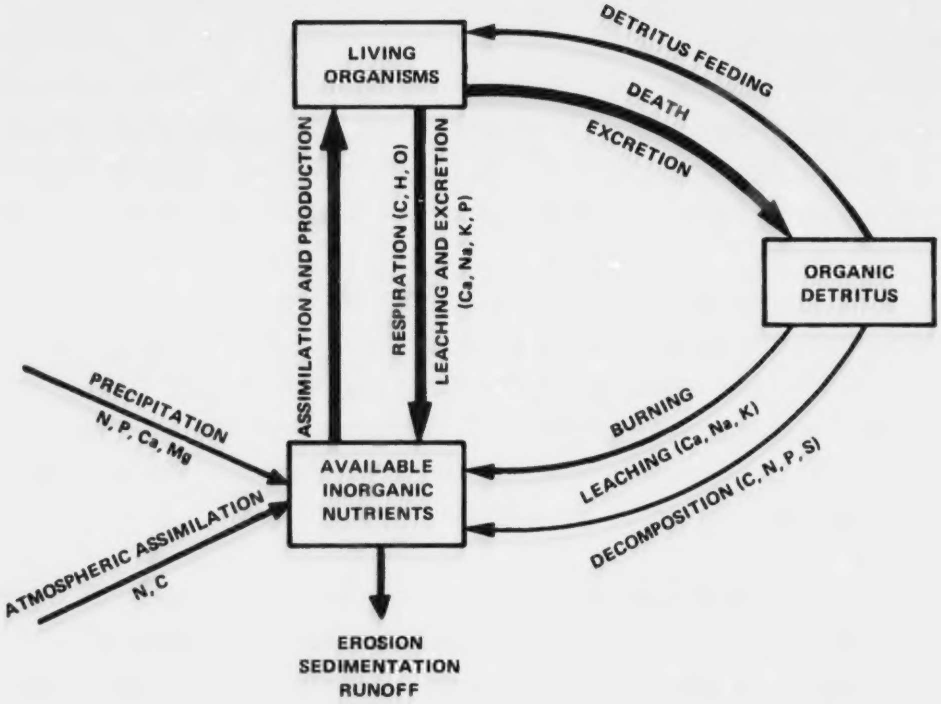

LIVING ORGANISMS
ORGANIC DETRITUS
AVAILABLE INORGANIC NUTRIENTS
DETRITUS FEEDING
DEATH
EXCRETION
ASSIMILATION AND PRODUCTION
RESPIRATION (C, H, O)
LEACHING AND EXCRETION (Ca, Na, K, P)
PRECIPITATION N, P, Ca, Mg
ATMOSPHERIC ASSIMILATION N, C
BURNING
LEACHING (Ca, Na, K)
DECOMPOSITION (C, N, P, S)
EROSION
SEDIMENTATION
RUNOFF

Figure B.E.9
GENERALIZED DIAGRAM OF NUTRIENT CYCLING

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
AND PROPOSED GAILLARD QUARRY

occurs through substrate weathering, precipitation, or atmospheric assimilation. In forests, rainfall can contribute from 30 to 75 percent of the macronutrients (N, P, Ca, Mg). In southern forests no differences have been found in the amount of throughfall in pine and hardwood forests (Henderson, et al., 1977). However, the timing of nutrient cycling differs with forest type. More macronutrients are cycled in the dormant season in pine forests than in hardwoods. The numbers of kinds and the abundances of soil litter fauna are lower in pine plantations than in the hardwood areas (Cornaby, et al., 1975). Thus, one might expect slower turnover of nutrients in the pine communities compared to the hardwood communities. This slower turnover may explain the higher carbon storage values in pine than in hardwood litter (Yount, 1975).

Throughfall and stemflow carry nutrients toward ground level. The litter and soil materials may be decomposed by fungi, bacteria, or soil arthropods. The released nutrients are leached by runoff water or absorbed by plant root systems. Various chemical changes may take place in the soil, including nitrification-denitrification (Todd, et al., 1975) and salt formation of nutrients in the soil.

The floors of temperate forests store the major reservoirs of elements required for ecosystem metabolism and structural maintenance. For example, in the deciduous forests of North Carolina and probably at the Alabama quarry site, most of the nitrogen is associated with soil organic matter or vegetation pools (Mitchell, et al., 1975). Litterfall accounts for approximately 60 percent of internal nutrient input (P, K, Ca, Mg) to forest floor (Carlisle, et al., 1967).

The pastures and old fields of the quarry site lack the nutrient reservoirs of forest systems (deep litter and woody structural material). Thus, in pastures and old fields, there is a rapid turnover of nutrients and a greater loss of nutrients. The loss may be twice as much as in forests (Reichle, 1975).

The present quarry site system is in a state of nutrient cycling imbalance because of the current activities on the site (see Figure B.E.10). There is large loss of nutrients and other elements through erosion. The burning of forest materials on the site released large quantities of stored nutrients, and there is also a significant input of nutrients especially nitrogenous compounds because of the use of the area by cattle.

Uses and Ecological Value of the Ecosystems

Forest Products

Monroe County had 206,000 hectares (508,800 acres) of commercial forests in 1972 (approximately 75 percent of the total area of the county). Of this area, 45,060 hectares (111,300 acres) were in loblolly-shortleaf pine, 55,789 hectares (137,800 acres) in oak-pine, and 60,081 hectares (148,400 acres) in oak-hickory (Hedound and Earles, 1973). Monroe County was the second largest hardwood producing county, eighth largest sawlog producer, and the ninth largest veneer log producer in Alabama in 1971 (Bertelson, 1972). The northern two-thirds of Monroe County, including the site, is considered best suited for forest product production (Harper, 1977). Pines, oaks, gums, and hickories occur at the site and are important forest product species. Approximately 60 percent of the site was forest but is now being logged. Current management practices involve non-forest uses.

Soil and Water Conservation and Flood Control

In addition to the commercial value, the forest ecosystems of the site provide important services in soil retention and erosion control for the area. Monroe County is considered to be a high erosion area. The forest slows the movement of rainfall through the system and provides a more even flow in the streams. The upland and floodplain forests contribute to the flood control of the Alabama River. Agricultural watersheds have significantly higher runoff and nutrient loads than forested watershed (Omernick, 1976).

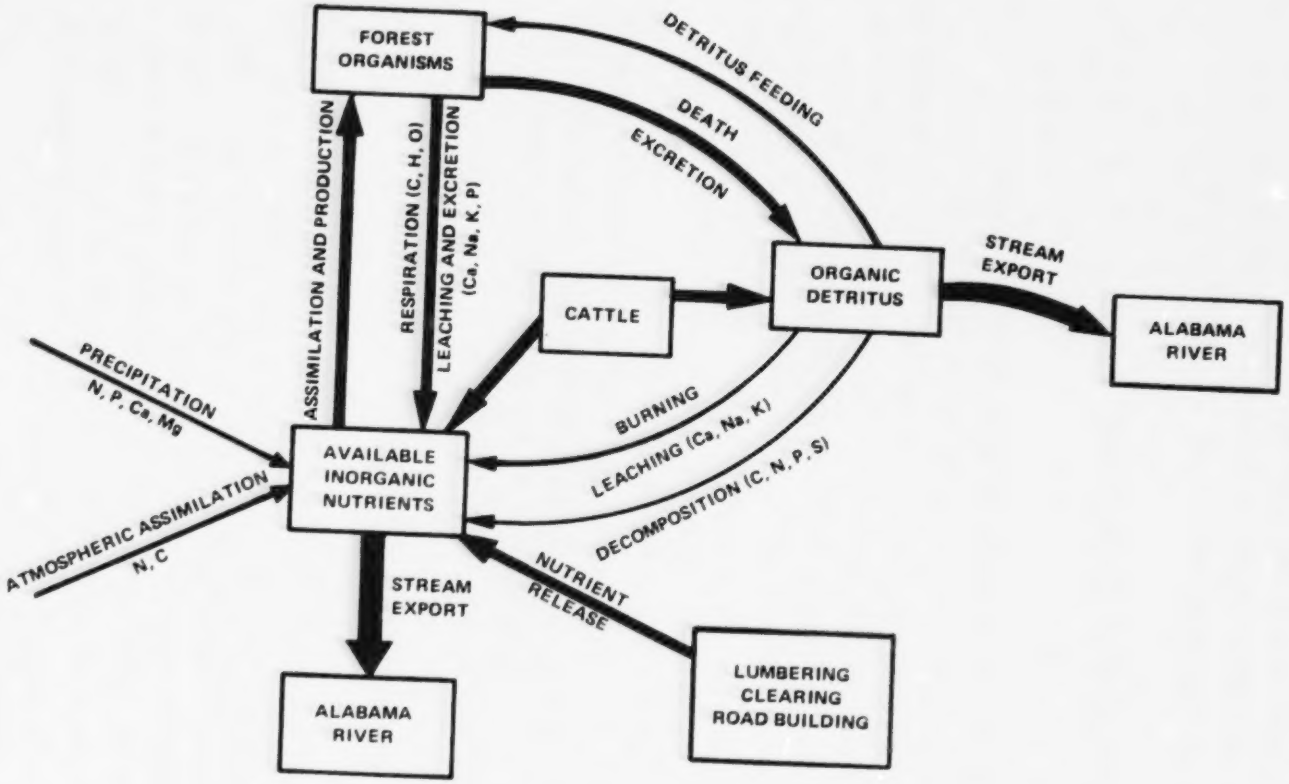

FOREST ORGANISMS
DETRITUS FEEDING
DEATH
EXCRETION
ORGANIC DETRITUS
STREAM EXPORT
ALABAMA RIVER
ASSIMILATION AND PRODUCTION
RESPIRATION (C, H, O)
LEACHING AND EXCRETION (Ca, Na, K, P)
CATTLE
PRECIPITATION N, P, Ca, Mg
ATMOSPHERIC ASSIMILATION N, C
AVAILABLE INORGANIC NUTRIENTS
BURNING
LEACHING (Ca, Na, K)
DECOMPOSITION (C, N, P, S)
STREAM EXPORT
NUTRIENT RELEASE
ALABAMA RIVER
LUMBERING CLEARING ROAD BUILDING

Figure B.E.10
GENERALIZED DIAGRAM OF NUTRIENT CYCLING IN THE ECOSYSTEM OF THE PROPOSED QUARRY SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

Wildlife Production

The proposed quarry site has a potentially high productivity for small game species such as bobwhite quail, mourning dove, and cottontail rabbit. Quail and rabbit will be common where about half the ground is exposed and the other half has abundant growth of herbaceous and woody plants (Sprunt, 1954). Present conditions in some areas offer good habitat for both species (see Figure B.E.11). Current agricultural practices, along with forestry management, provide good quality habitat for mourning dove. The quarry site offers a diversity of cultivated and forested lands, and deer inhabit most of these lands. A harvestable population of deer occurs on the site. Turkey and squirrel populations are declining and will continue to do so throughout the area because of the conversion of hardwood forest to pasture land. Although limited trapping occurs in this area of Alabama (Harper, 1977), some trappable populations of upland, bottomland, and riverine species can be expected on the site.

Recreational and Aesthetic Resources

The site is not unique in its recreational and aesthetic value; however, it has a number of natural features which have recreational and aesthetic importance. The area offers hunting for the species mentioned above. In addition, the vistas from the bluff and the relatively natural conditions of the lower reaches of Thompson Mill (also known as Marshalls), Hollinger, and Randons creeks are scenic.

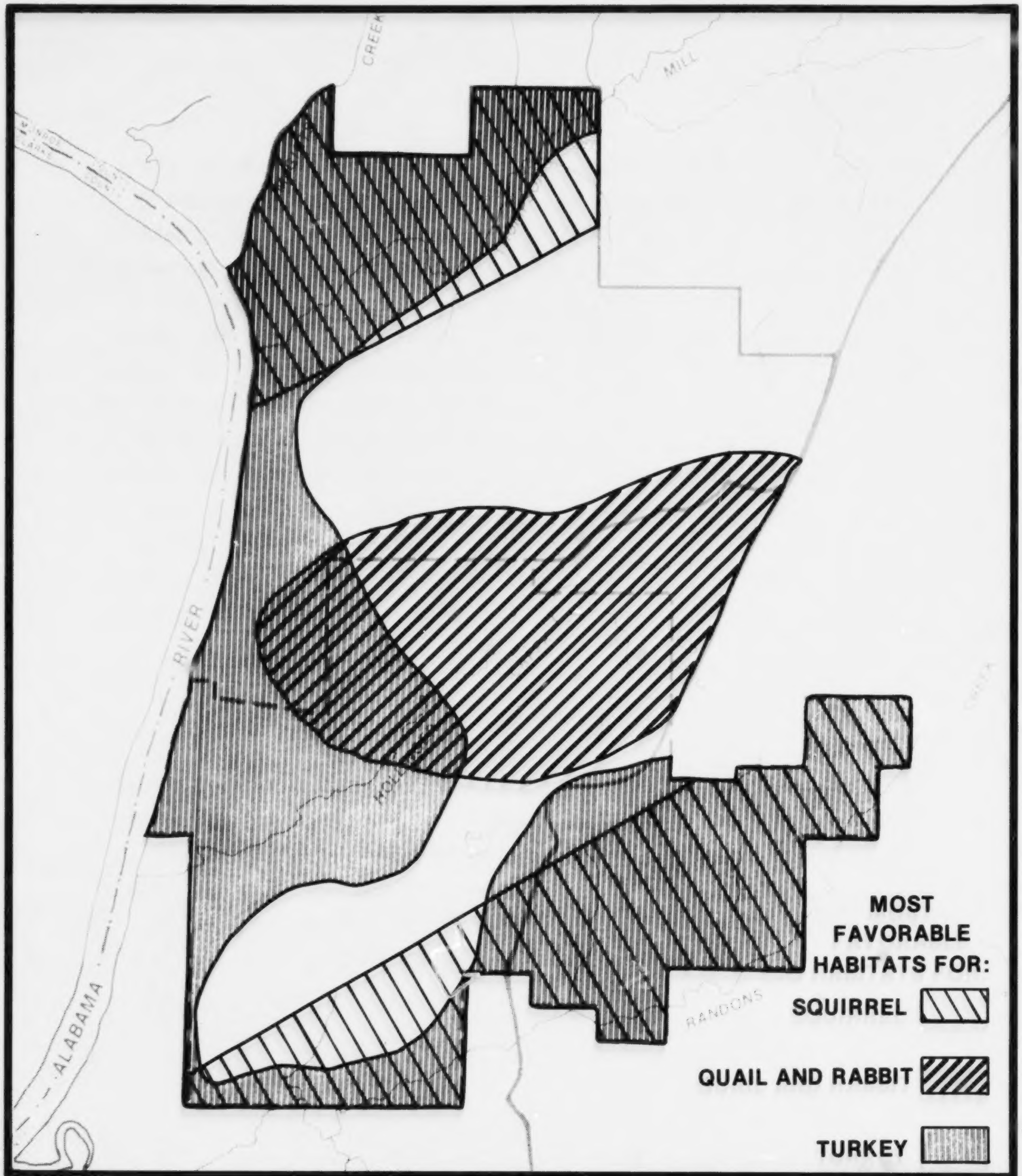

CREEK
MILL
RIVER
ALABAMA
RANDONS
CREEK
MOST FAVORABLE HABITATS FOR:
SQUIRREL ▧
QUAIL AND RABBIT ▨
TURKEY ▥

Figure B.E.11
GAME SPECIES HABITAT MAP OF THE PROPOSED QUARRY SITE

0 0.5 1
SCALE IN KILOMETERS

N

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

PROJECTED ENVIRONMENT 1992

The 1992 projections indicate that the entire quarry site will be converted to improved pasture, except for some of the hardwood bottom lands along Randons and Thompson Mill (Marshalls) creeks. Figure B.E.12 indicates the general plant succession and the projected 1992 conditions, and Figure B.E.13 illustrates the present interactions and the simplification of relationships when the site is converted to pasture. The conversion of forest land to pasture will result in increased erosion and consequent sediment loading to streams. Agricultural watersheds have significantly higher runoff and nutrient loads than forested watersheds (Omernick, 1976).

Conversion of forest to pastureland will reduce the diversity of wildlife on the site (see Figure B.E.14). There will be a decrease in forest and edge species; for example, the current turkey and squirrel populations will continue to decline. There will, however, be an increase in grassland species, such as mice, meadowlarks, and grasshopper sparrows.

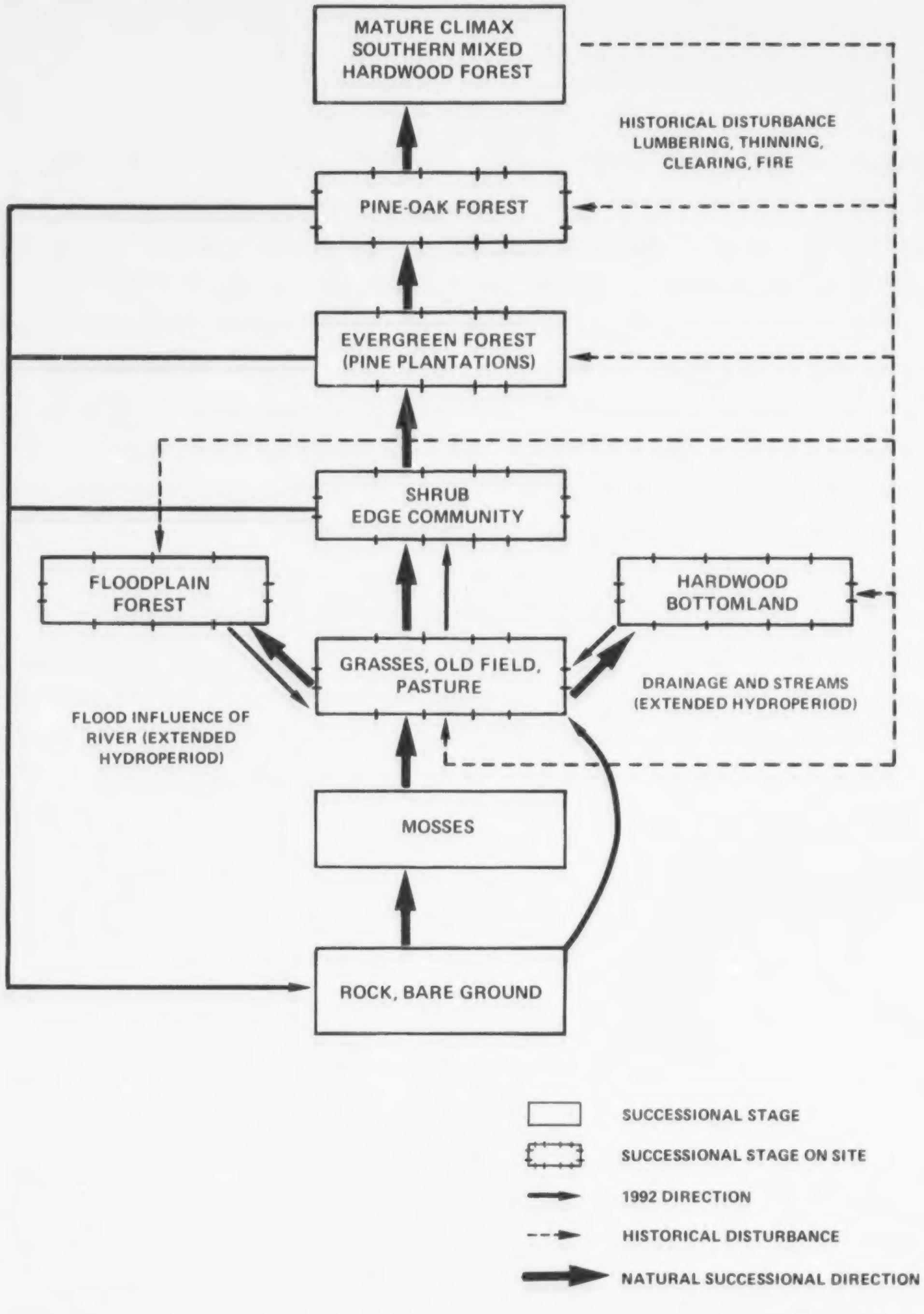

MATURE CLIMAX SOUTHERN MIXED HARDWOOD FOREST
HISTORICAL DISTURBANCE LUMBERING, THINNING, CLEARING, FIRE
PINE-OAK FOREST
EVERGREEN FOREST (PINE PLANTATIONS)
SHRUB EDGE COMMUNITY
FLOODPLAIN FOREST
HARDWOOD BOTTOMLAND
GRASSES, OLD FIELD, PASTURE
DRAINAGE AND STREAMS (EXTENDED HYDROPERIOD)
FLOOD INFLUENCE OF RIVER (EXTENDED HYDROPERIOD)
MOSSES
ROCK, BARE GROUND
SUCCESSIONAL STAGE
SUCCESSIONAL STAGE ON SITE
1992 DIRECTION
HISTORICAL DISTURBANCE
NATURAL SUCCESSIONAL DIRECTION

Figure B.E.12
GENERAL PLANT SUCCESSION AND 1992 BASELINE CONDITIONS OF THE PROPOSED QUARRY SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

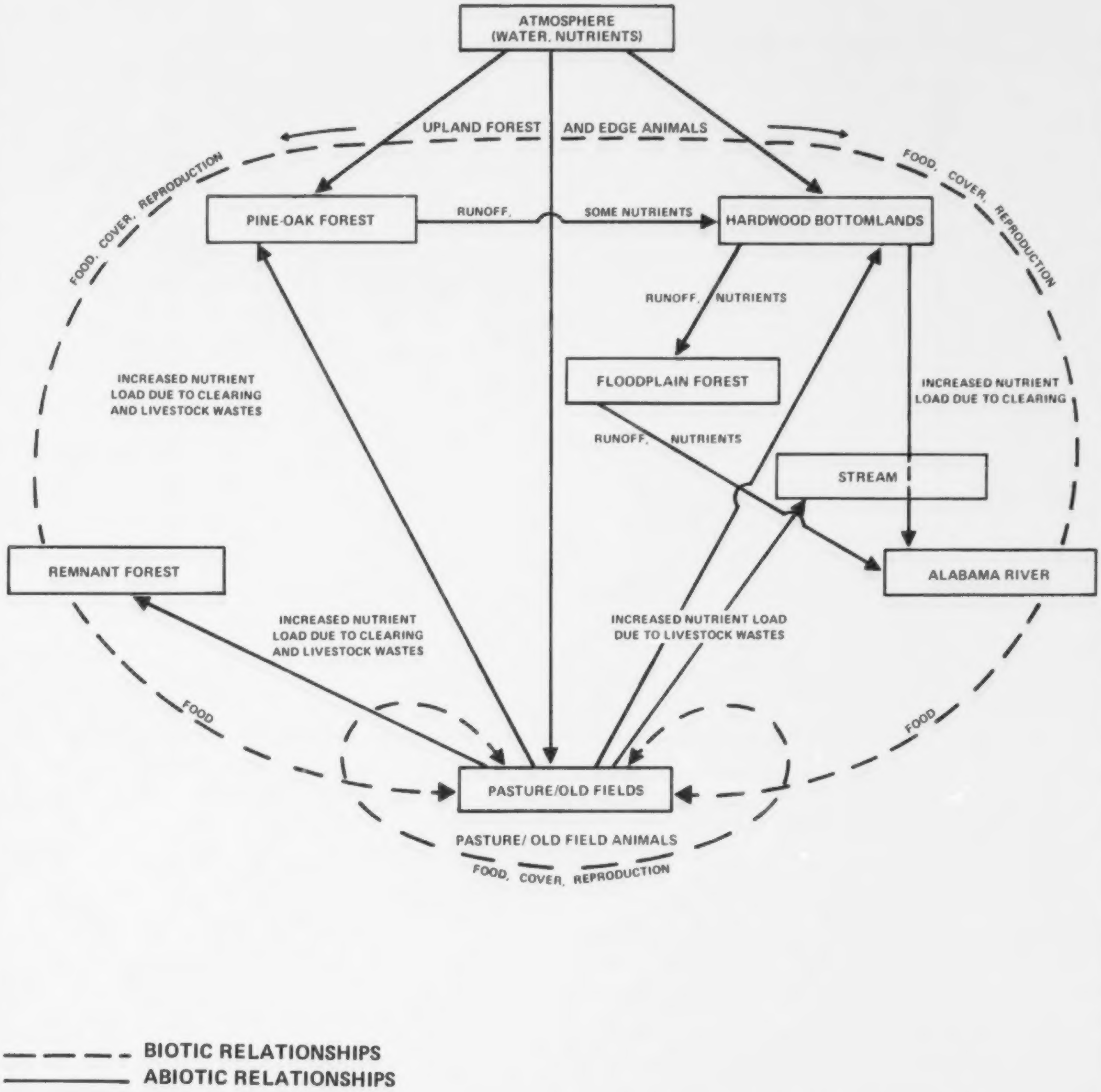

ATMOSPHERE (WATER, NUTRIENTS)
UPLAND FOREST AND EDGE ANIMALS
FOOD, COVER, REPRODUCTION
FOOD, COVER, REPRODUCTION
PINE-OAK FOREST
RUNOFF, SOME NUTRIENTS
HARDWOOD BOTTOMLANDS
RUNOFF, NUTRIENTS
FLOODPLAIN FOREST
INCREASED NUTRIENT LOAD DUE TO CLEARING AND LIVESTOCK WASTES
INCREASED NUTRIENT LOAD DUE TO CLEARING
RUNOFF, NUTRIENTS
STREAM
REMNANT FOREST
ALABAMA RIVER
INCREASED NUTRIENT LOAD DUE TO CLEARING AND LIVESTOCK WASTES
INCREASED NUTRIENT LOAD DUE TO LIVESTOCK WASTES
FOOD
FOOD
PASTURE/OLD FIELDS
PASTURE/ OLD FIELD ANIMALS
FOOD, COVER, REPRODUCTION
BIOTIC RELATIONSHIPS
ABIOTIC RELATIONSHIPS

Figure B.E.13
ECOLOGICAL RELATIONSHIP OF THE ECOSYSTEMS
OF THE PROPOSED QUARRY SITE

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

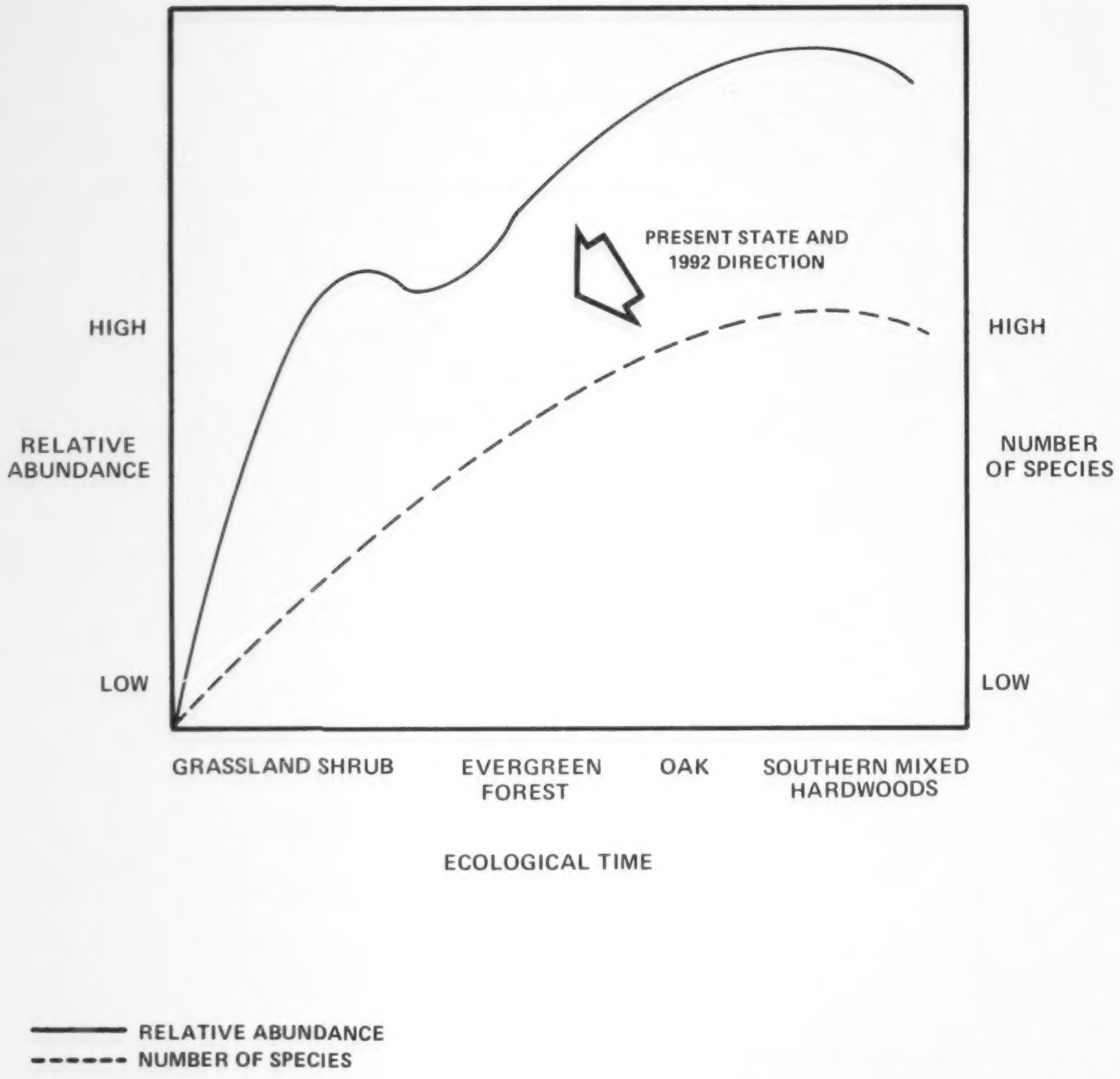


Figure B.E.14
GENERALIZED PATTERN OF BIRD AND MAMMAL SUCCESSION IN SOUTHEASTERN FORESTS
(Adapted from Johnston and Odum, 1956; Hirth, 1959)

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

IMPORTANT SPECIES ANALYSIS

Introduction

This section discusses any commercially or recreationally important plants and animals, as well as those plants and animals which affect the well-being of some important species or are critical to the structure and function of the ecological systems of the two sites. This analysis is based on plant and animal surveys in the spring, summer, and fall of 1977. The surveys were supplemented by consultation with Mr. John Harper of the Conservation Service (Monroeville) and with Alabama Department of Conservation agents (Mr. William Boone and Mr. Jim Davis, Monroe County). The discussion is presented as summaries of the important species of the proposed plant and quarry sites followed by more detailed accounts of these species.

Plant Site

Vegetation

The important commercial plant species of the upland area are pine and oak; however, the most valuable pines and oaks have been removed. The site is too small to allow efficient commercial forestry development.

Several of the marsh plants are important as indicator species. Juncus roemarianus becomes established under brackish conditions, but may be found in areas which have since become less brackish or even fresh. Cladium jamaicense is associated with fresh or "intermediate" tidal marshes. The freshwater marsh area separated from the Cladium marsh is dominated by Typha latifolia, a plant which is intolerant to salinity. Collectively the marsh plants are considered valuable for wildlife and fisheries production (see section on wildlife production at the plant site).

Animals

The important animals which occur or can be expected to occur on the proposed plant site are fur-bearing animals (e.g., nutria, raccoons) and game species (e.g., swamp and cottontail rabbit, bobwhite quail, mourning dove, various rails, common snipe, and waterfowl). Raccoon tracks were very common throughout the site and reflect the activity of numerous individuals on the site. Nutria were observed in the upper reaches of the freshwater marsh, as well as in the brackish marsh. Of the game species, only the cottontail rabbit (*Sylvilagus floridanus*), bobwhite quail (*Colinus virginianus*), and mourning dove (*Zenaida macroura*) were abundant in the upland areas. Common snipe and the calls of various rails (clapper, king, and sora rails) were heard in both the fresh and brackish marsh. These species were particularly abundant in the freshwater marsh. Quail call counts of singing males revealed a substantial number of these birds. Likewise, calling mourning doves were recorded throughout the upland area of the site. Several cottontail and swamp rabbits were observed, as well as numerous rabbit signs in the upland areas. A description of preferred habitat, potential carrying capacity, and foods of these animals is presented in the individual species accounts. Other species, which may be as important but apparently do not occur in large numbers at the site, include mink, otter, gray squirrel, and muskrat.

Past and present habitat manipulation over most of the upland area has resulted in thick secondary growth of early stage longleaf pine forest. This second growth has produced a number of plants important to game and other wildlife species. These conditions would seem favorable for supporting some populations of upland species. Evaluation of plant communities revealed that foods and cover were present in moderate to average quantities. Food-producing species, which were found in abundance, consisted mainly of fleshy fruits (*Rubus* spp. and *Vaccinium* spp.) and grasses (*Andropogon* spp. and *Panicium* spp.) along with various other trees, shrubs, and herbaceous plants (see Table B.E.1). Although *Andropogon* spp. are of some value as food plants, their main value at the site is to provide cover for various small game species. In addition, good cover exists in the form of bushy thickets and blackberry patches, and the water sources seem adequate to meet the needs of most species.

Quarry Site

Vegetation

The commercially important species are pine and hardwoods which have been discussed earlier in "Uses and Ecological Values of the Ecosystem--Forest Products." There are numerous plants, such as oaks and hickories, which are valuable food sources for wildlife. These are discussed under individual game species. Cypress, which is an indicator of wetlands and has commercial value, is found in the floodplain forest of Hollinger and Randons creeks on the property.

Animals

Important species of the proposed quarry site include a large variety of game and fur-bearing animals. Common small game species of wildlife consist of bobwhite quail, mourning dove, and cottontail rabbit. Abundant populations of whitetail deer are present in much of the quarry site and on adjoining lands. Smaller populations of wild turkey and gray squirrel are also present. The land seasonally attracts a few migratory species, such as woodcock, various ducks, and rails.

Discussion of Individual Species

Important Game Species

Rails--Of the species of rails that frequent coastal Alabama (Table B.E.2), only the sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), clapper rail (*Rallus longirostris*), and king rail (*Rallus elegans*) are of economic importance. Many members of the family *Rallidae* have extensive migrations; however, some population of king rails and clapper rails have limited seasonal movements (Sanderson, 1977). The Virginia, king, and sora rails are found primarily in freshwater marshes except during migration when they may utilize brackish and salt marshes. Clapper rails are principally salt marsh birds. As one of the top consumers in salt marshes, clapper rails are indicators of overall conditions of the estuarine ecosystem (Day, 1973). In Georgia, Oney (1954) estimated tidal marsh populations of rails at between 3.3 and 3.7 birds per hectare (1.3 and 1.5 birds per acre), and Day (1973) concluded that fresh marshes contained an average of 5.2 rails per hectare (2.1 rails per acre) in the area of Airplane Lake, Louisiana. These densities are likely to be found at the plant site.

Suitable habitat for both salt marsh and fresh marsh species is found in the North Fork Deer River. The sora clapper and king rail were recorded to be in the marshes of the plant site. Insects, crustaceans, and spiders predominate in the diet of most rails. However, seeds of marsh plants make up an appreciable portion of their diet (Martin, et al., 1951). Presently, the marsh is relatively undisturbed and provides cover for migratory and resident birds. The ESE fall survey revealed a substantial number of sora, clapper and king rails in both the fresh and brackish marsh.

Waterfowl--In Alabama, the bulk of the waterfowl winter in the Tennessee Valley, on upper Mobile Bay, and on Mississippi Sound (Imhof, 1976). Species known to use the Mobile Bay and the Alabama River drainage areas as wintering grounds are mallard, black duck, canvasback, redhead, common goldeneye, blue-winged teal, lesser snow-goose, hooded merganser, and red-breasted merganser (Bellrose, 1976). Other species which occur commonly as migrants are the gadwall, green-winged teal, and ring-necked duck. Few waterfowl breed in Alabama. The wood duck is the only major breeding waterfowl. There is scattered breeding of the mottled duck. Aerial surveys in the winter show the duck population in Mobile Bay in 1974 to total 6,300 ducks and 21,800 coots (Swingle, et al., 1975). According to Bellrose (1976), wood duck breeding populations in Alabama number 28,000. The heaviest concentration of these breeding birds occurs along the Alabama and Tombigbee River. Summer brood surveys show about 50,000 young wood ducks are produced annually in the state (Beshears, 1974). Swamps and beaver ponds are probably the most utilized habitat in Alabama. Two wood ducks were observed along a flooded section of Randons Creek in the fall survey. Bird surveys along the North Fork Deer River were conducted too early to record wintering waterfowl on the site. Our habitat analysis indicates probable use of the marsh and ship channel by wintering ducks and geese.

Turkey--Gone from most of its former range, the eastern wild turkey (Meleagris gallopavo) has been reintroduced into much of the eastern United States and some sections of the western part of the county. Although no census of turkey populations was made, turkeys were seen on numerous occasions at the quarry site. Davis (1977) estimated .15 birds per hectare (.06 birds per acre) on most forested lands adjoining the proposed quarry site. In similar areas of Alabama, Speak, et al. (1975), reported population densities of .12 birds per hectare (.05 birds per acre). The home ranges for turkey in the spring-summer was 790 hectares (1,951 acres) for hens and 474 hectares (1,171 acres) for gobblers. Davis (1977) stated that a general reduction in the number of turkeys has occurred on the proposed quarry site because of current timber management practices. The primary reason for their decline is the harvesting of most mature, mast-producing species of trees and the conversion of hardwood forest to cleared pasture (areas with more than 30 percent cleared pasture will support few turkey).

Food sources are considered poor in quality. Well-formed, mast-producing species are essentially absent except for a few large trees along the floodplain area of Randons Creek and the upper slopes and terraces of Thompson Mill Creek (Marshalls Creek). Available food (Table B.E.6) was rated as fair for most habitats. Currently, there are well-distributed water sources over most of the area.

Generally, good turkey habitat contains natural stands of mixed hardwoods, groups of conifers, relatively open understory, scattered clearings (12 to 15 percent), well-distributed water [at least two sources every 260 hectares (640 acres)], reasonable freedom from disturbance, and adequate area (U.S. Forest Service, 1971; Speak, et al., 1975). The present habitat of the quarry site is considered poor for turkey. The low rating for habitats is partly due to the absence of mature hardwood forest, the paucity of large well-formed oaks, the continued encroachment by man, and the clear cutting of large acreages of pine-oak forest.

Table B.E.6. Preferred Foods, in Relative Order of Abundance, of Important Game Species Occurring on the Proposed Quarry Site, Monroe County

	Deer			Turkey			Squirrel	
	Plant	Edible Parts		Plant	Edible Parts		Plant	Edible Parts
***	Row Crops	f-gl	**	Row Crops	f-gl	***	Hickory	f
*	Blueberry	f-gl	**	Blueberry	f-gl	***	Walnut	f
***	Greenbrier	f-gl-dl	**	Greenbrier	f-gl	**	Maple	st + b
***	Maple	gl	*	Hickory	f	*	Hop hornbeam	f
**	Dogwood	f-gl	**	Dogwood	f-gl	*	Sweet gum	f
*	Grape	f-gl	*	Grape	f-gl	****	Oaks	f
*	Black gum	gl	*	Black gum	f-gl	****	Buds and Flowers	
*	Saw palmetto	f	****	Honeysuckle	f	***	Berries	
****	Honeysuckle	gl-st+b	*	Poison ivy	f			
****	Oaks	f-gl-dl	*	Holly	f-gl			
*	Black cherry	f	****	Oaks	f			
*	Pine	dl	***	Beech	f			
*	Blackberry	f-gl	*	Black cherry	f-gl			
			*	Ash	f			
			*	Panicgrass				
			*	Sedge	f			
				Animal Matter				
			***	Grasshopper				
			*	Butterfly				
			*	Spider				

Key: f = fruit; gl = green leaves; dl = dry leaves; st + b = succulent twigs and buds.

Notes:
1. Plant species are listed in order of frequency of occurrence at the site.
2. Asterisks indicate the preferences of the animals for these food items, with one asterisk indicating the least preferred food and four asterisks indicating the most preferred food.

Source: Environmental Science and Engineering, Inc. 1977.

Quail--The bobwhite quail (Colinus virginianus) is found throughout Alabama, mostly around farmlands, forest fringes, and old fields. Quail populations over most of Monroe County and southwestern Alabama are fairly small (Davis, 1977). Clear-cutting and clean farming methods have left little suitable habitat for these birds. Some sections of the proposed quarry site offer some of the best quail habitat in Monroe County (Davis, 1977). Good quail habitat may contain one bird per 0.4 hectare (one bird per acre) (Rosene, 1969).

Quail were commonly seen throughout the quarry site. Population counts were not made, but potential habitat and probable carrying capacity were evaluated. The best habitat occurs on the central portion of the quarry site (Figure B.E.9). In these areas a fairly good ratio of mixed grassland, grain cropland, brush, and mixed woodlots was observed. The area consists of approximately 1,146 hectares (2,833 acres) with a potential carrying capacity of one quail per 1.6 hectares (4 acres). Within this area a good blend of escape, nest, brood, and forage cover exists. In many cases the scattered woodlots provide preferred edge communities. In areas where grazing by cattle has not been extensive, there is ample food supply in the form of insects, seeds, and plant parts of legumes and grasses.

Mourning Dove--The mourning dove (Zenaida macroura) is an abundant and widely distributed species throughout the United States and southern Canada. This species does well in suburbs and farmlands and also frequents forested areas. Doves are year-round residents in Monroe and Mobile counties with the greatest numbers occurring in the fall and winter because of migration from the northern states (Imhof, 1976). Dove hunting is the most popular form of bird hunting in Alabama. About 3.25 million doves are taken each year in Alabama by over 100,000 hunters. Currently, some of the best dove habitat in the Monroe County area is found around croplands and remnant forest and cleared pasture on the central portion of the proposed quarry site. Marginal habitat exists in some sections of those cleared areas formerly occupied by pine-oak forest. No estimates were made of current mourning dove populations at either site. However, doves were abundant in both the summer and fall surveys. Breeding dove densities of nine pair per 4.5 hectares (11 acres) are common in excellent habitat (U.S. Forest Service, 1971).

Woodcock and Common Snipe--The woodcock (Philohela minor) is primarily restricted to the eastern part of North America, while the common snipe (Capella gallinago) may be encountered over most of North and Central America (U.S. Fish and Wildlife Service, 1975). The woodcock inhabits moist woodlands and the common snipe frequents marshes and bogs. Both species breed in the northern part of their range with many birds wintering in the Gulf states (Rue, 1973). Of the two species, the woodcock is more likely to occur in the moist woodlands and swamps of Randons Creek and the Alabama River. Additional habitat for woodcock is found surrounding the lower portion of Thompson Mill Creek (Marshalls Creek), but this is of limited acreage. In the fall, numerous common snipe were sighted in the old fields at the quarry site and the fresh marsh at the plant site.

Deer--The white-tailed deer (Odocoileus virginianus) is quite abundant at the quarry site and occurs throughout Alabama. During the 1975 hunting season in Alabama, an estimated 210,556 hunters harvested approximately 155,625 deer (Alabama Department of Conservation, 1976). The preferred habitat of deer is the brushy stages of second-growth deciduous forest. Deer, however, are adaptable and can survive in a multitude of forested and nonforested communities. According to Marchington (1968) and Byford (1970), the home range for most southeastern deer varies from roughly 60 to 100 hectares (150 to 250 acres), usually averaging 80 hectares (200 acres). In the Southeast, population densities average approximately one deer per 8 hectares (20 acres).

According to the Alabama Department of Conservation and Natural Resources there is an estimated one deer per 5 to 6 hectares (12 to 15 acres) on most land adjoining the quarry site. Environmental Science and Engineering population censuses indicated between 115 and 200 deer on the quarry site or one deer per 14 hectares (35 acres).

Our habitat evaluation indicates that forage is of average quantity on the proposed quarry site. Available browse foods are sparse in most forest types except those portions of the pine-oak forest which are being logged (Figure B.E.7). On these lands, current timber management practices in the form of clear-cutting of 160 to 200 hectares (400 to 500 acres) are temporarily making large amounts of browse available to deer; however, these actions will eventually reduce a major portion of the pine-oak community along with its associated forage plants. Grasses, weeds, and row crops supply a large portion of the dietary needs of deer on the southern half of the site. In the remnant forest and cleared pasture communities, grazing cattle have significantly reduced available foods. Mature soft mast species of trees were generally few in number and insufficient in size for producing substantial mast crops (Table B.E.6).

The various water courses provide good water sources and excellent cover. Many of these waterways are of good quality and flow throughout the year. Good cover exists in the form of hardwood bottomlands and dense stands on the slopes and terraces of streams.

Squirrel--Three species of squirrel inhabit the forest communities of Alabama: gray squirrel (*Sciurus carolinensis*), fox squirrel (*S. niger*), and southern flying squirrel (*Glaucomys volans*). Of these three, only the gray squirrel and fox squirrel are significant as a hunting resource. The gray squirrel is an inhabitant primarily of southern mixed hardwoods, whereas the fox squirrel generally prefers open woodlands and field-forest edges. Average densities for squirrels in the area of the Tombigbee Waterway ranged from 5 to 12 per hectare (2 to 5 per acre) in good habitat (U.S. Army Corps of Engineers, Mobile District, 1974). The home range of gray squirrels varies from .6 to 3.2 hectares (1.5 to 8 acres) and that of the fox squirrel from 2 to 4 hectares (Uhlig, 1956). Age, sex, and population densities have significant influence upon home range.

Currently, the habitat conditions in most plant communities of the plant and quarry sites are not supportive of large numbers of either gray squirrel or fox squirrel. Relative carrying capacity is determined by such heavy-seeded species as: oak (Quercus spp.); hickory (Carya spp.); walnut (Juglans nigra); and beech (Fagus grandiflora) (U.S. Forest Service, 1971).

Clear-cutting has eliminated many of the high quality mast-producing oaks and beeches in most forested communities of the plant and quarry site. The most productive systems were those areas located on the slopes and terraces associated with various water courses. Food sources in these systems consisted mainly of various hickories and black walnut (Table B.E.6).

Population censuses of squirrels at the quarry site show that squirrel populations are low in most areas of the property. Densities in the pine-oak forest, and remnant woodlots were less than .6 squirrels per hectare (.24 per acre). Those forest communities adjoining the stream banks of Hollinger Creek, Randons Creek, Thompson Mill Creek (Marshalls Creek), and the Alabama River are the most productive with an average of 6 squirrels per hectare (2.4 per acre). Davis (1977) reported squirrel population at the quarry site to be very low because of the lack of mature hardwood forest.

Only one squirrel was observed at the plant site. No nests were found on the property. The recent logging of the site has reduced the population of squirrels.

Rabbit--Two species of rabbit which commonly occur in the coastal plain of Alabama are the eastern cottontail (Sylvilagus floridanus) and the swamp rabbit (S. aquaticus). Rabbit populations may reach densities of 0.75 rabbits per hectare (0.3 per acre) in good habitat and 1.5 rabbits per hectare (0.6 per acre) in excellent habitat (Willis, 1975). The entire upland area of the plant site provides good rabbit habitat. Rabbits and signs of rabbits were common throughout the site.

Approximately 1,143 hectares (2,833 acres) of cleared pasture, remnant forest, grassland, and brushy thickets at the quarry site are currently good habitat for the eastern cottontail rabbit (Figure B.E.11).

Food, mainly grasses and legumes, was abundant in most ungrazed sections of the cleared pasture and remnant forest community. Suitable habitat for the swamp rabbit, which consists of wooded swamps, wet bottomlands, and marshes, occurs along the floodplain of Randons Creek and certain areas of the Alabama River. Food was abundant on the more upland slopes of the floodplain areas adjacent to Randons Creek and in those lands near the confluence of the Alabama River and feeder streams.

Fur-Bearing Mammals

Raccoon--The range of the raccoon (Procyon lotor) extends from southern Canada to Panama. In mixed woodlands, raccoons prefer bottomlands for denning sites. They forage in both terrestrial and aquatic habitats (Golley, 1962). The home range of raccoons is about 81 hectares (200 acres). Spring population densities average between one raccoon per 2 to 4 hectares (5 to 10 acres) in hardwood bottomland and swamps. Raccoons which were found to be common at the plant site use both the marsh and upland areas. Evidence of feeding on blue crabs was found in the brackish marsh. The quarry site has suitable habitat for maintaining a relatively large population of raccoons. The most favorable denning sites are located in hardwood bottomlands of Randons Creek, Thompson Mill Creek (Marshalls Creek), and the various feeder streams of the Alabama River.

Opossum--The Virginian opossum (Didelphis marsupialis) is abundant in the Southeast. This species is common in nearly all wooded areas and coastal marshes. In coastal Florida (Ehrhart, 1976), the minimum densities varied from 5 per hectare (2 per acre) in the spring, to 1.9 per hectare (.8 per acre) in the winter. Habitat conditions are favorable for supporting populations of opossum at both sites. Deciduous forest of bottomlands and along streams will contain the greatest densities (Golley, 1962).

Red Fox and Gray Fox--The red fox (Vulpes fulva) and the gray fox (Urocyon cinereoargenteus) occur over large portions of North America. According to Golley (1962), the red fox prefers more open habitat, whereas the gray fox is more often found in lowlands adjacent to dense bottomland forest. There is, however, much overlap in home range and both species may occur together. Areas with the greatest diversity of fields and woods probably would support the greatest density of either species. Currently, the habitats at the quarry site are suitable for both the red fox and the gray fox. Although not observed in this study, both species are reported in the area (Harper, 1977).

Bobcat--Lynx rufus occurs across southern Canada and south over the entire United States, except for the midwestern corn belt, to southern Mexico. This species is primarily found in hardwood bottomlands and swamps as well as in forested areas next to these systems. Bobcats are likely throughout the plant site. The preferred habitat at the quarry site is located in the lowlands of Randons Creek, Thompson Mill Creek (Marshalls Creek), and surrounding the Alabama River.

Beaver, Muskrat, Mink, and River Otter--Other fur-producing mammals of the lower coastal plain of Alabama are the beaver (Castor canadensis), muskrat (Ondatra zibethica), mink (Mustela vison), and river otter (Lutra canadensis). Beavers and muskrats are associated with ponds, marshes, and streams. An active beaver dam system was found near the mouth of Randons Creek at the quarry site. Signs of beaver were observed on the other creeks and the Alabama River. No signs of beaver were found at the plant site. Otters are primarily a riverine and salt marsh species. Mink are usually found in close association with various waterways. These species were not observed during the study but are reported to occur on both sites (Harper, 1977). Densities of beavers are not definitely known for this area. Beshears and Haugen (1953) report Alabama farm ponds have densities of 22 muskrats per hectare (9 per acre) of pond. In the salt marsh of Louisiana, Day (1973) calculated an average of one muskrat per 3.2 hectares (8 acres). In these same systems otter and mink are reported at densities of approximately one mink and one otter per 16 hectares (40 acres).

Nutria--*Myocastor coypus* is native to temperate South America, and has been introduced widely in the United States and western Europe (Lowery, 1974). In Alabama it is found in the coastal estuaries and on the Tombigbee, Alabama, and Escambia drainages. Habitats of the nutria consist of salt marsh, fresh marsh, swamps, ponds, and lakes; however, nutria are more abundant in brackish and fresh marshes (Day, 1973). Day also stated that nutria average one per 0.4 hectare (one per acre) in saline marshes. Vegetation used by the nutria include pickerelweed, cutgrass, *Sagitaria*, alligator grass, and some cattail (Lueth, 1957). Lueth also stated that tidal marshes containing an abundance of cutgrass and alligator grass were the preferred habitat. Suitable habitat and forage foods (Table B.E.5) were found in the marshes of the North Fork Deer River. Nutria were observed in both the freshwater and brackish marsh of the plant site. Nutria do not occur at the quarry site.

RARE AND ENDANGERED SPECIES ANALYSIS

Introduction

In 1972 and 1975 the State of Alabama developed and formalized a list of rare and endangered species for the state (Boschung, 1976). Three major groups were defined and identified:

1. Endangered Species (E)--those species in danger of extinction throughout all or a significant portion of their range in Alabama.
2. Threatened Species (T)--those species which are likely to become endangered in the foreseeable future throughout all or a significant portion of their range in Alabama.
3. Species of Special Concern (SC)--those species which must be continually monitored because of imminent degrading factors. Their limited distribution or biological characteristics may cause them to become threatened or endangered in the foreseeable future.

In historical times one fish (hairlip sucker), two species of birds (passenger pigeon and Carolina parakeet), and two species of plants (Linum macrocarpum, a flax, and Helianthus smithii, sunflower) formerly found in Alabama have become extinct. Other species of animals no longer exist in Alabama although they occur elsewhere. Today there are several hundred plants and animals that are considered threatened by habitat destruction, competition from introduced species, pesticides, and other forms of human interference. This analysis is based on direct observations by Environmental Science and Engineering, Inc., personnel and local governmental agencies, on the Habitat Association Analysis (Willis, 1975), and on literature sources. Consideration is given to only those species which are listed by the Department of Interior and the State of Alabama and which have ranges that include the plant and quarry sites.

Plant Site--Summary

A total of 29 species of animals considered endangered, threatened, or of special concern (Table B.E.7) have ranges which include the plant site. One threatened species (the American alligator) and two species of special concern (merlin and little blue heron) were observed on the plant site. These species were found in the marsh areas. Twelve species are likely to be found on the site; these are either birds with less restrictive habitat requirements or animals associated with marshes. The disturbed nature of the upland forest lowers the probability of occurrence of most of the rare and endangered species associated with forest communities.

There are four endangered species and eleven threatened species of plants which are known to occur in Mobile County habitats similar to the proposed plant site (Table B.E.8). None of these species was observed on the plant site. Their probability of occurrence is low due to past disturbance and habitat destruction in the areas.

Quarry Site--Summary

Fourteen species of plants and animals which are endangered, threatened, or of special concern (Tables B.E.8 and B.E.9) have ranges that include the quarry site. Several of these species--American alligator, bald eagle, red shouldered hawk, little blue heron, and the wood stork--have been observed on or near the site. The present conversion of the quarry site from forest to pasture will not affect the alligator, but will not increase and may diminish the occurrence of the herons and the wood stork.

Isotria verticellata is the only plant species of special concern found on the Monroe County proposed quarry site (Table B.E.8). Present clearing of the hardwood forest will reduce this species.

Table B.E.7. List of Vertebrates (Endangered, Threatened, or of Special Concern) Which Are Known or Expected to Occur on or in the Vicinity of the Proposed Plant Site, Mobile County, with their Preferred Habitats and Likelihood of Occurrence (Tentative)

Scientific Name	Common Name	Status	Habitat	Likelihood of Occurrence
Rana *heckscheri*	River frog	Special Concern	Swampy margin of small streams	Likely
Rana areolata sevosa	Dusky gopher frog	Threatened	Pine flatwoods	Marginal
Ambystoma cingulatum	Flatwoods salamander	Endangered	Pine flatwoods	Marginal
Alligator mississippiensis	American alligator	Threatened	Fresh and brackish marsh	Positive
Pituophus melanoleucus lodgingi	Black pine snake	Endangered	Longleaf pine and sandhill communities	Marginal
Rhadinaea flavilata	Pine woods snake	Special Concern	Deep pine flatwoods	Marginal
Crotalus adamanteus	Eastern diamondback rattler	Special Concern	Pine flatwoods	Marginal
Chrysemys alabemensis	Alabama red-bellied turtle	Threatened	Fresh marsh	Likely
Gopherus polyphemus	Gopher tortoise	Threatened	Pine-oak and sandhill communities	Marginal
Pelecanus occidentalis	Brown pelican	Endangered	Brackish marsh	Likely
Anas fulvigula	Mottled duck	Threatened	Fresh and brackish marsh	Likely
Accipiter striatus	Sharpskinned hawk	Special Concern	Any habitat	Marginal
Accipiter cooperii	Cooper's hawk	Special Concern	Pine-oak hardwood	Likely
Buteo lineatus	Red-shouldered hawk	Special Concern	Wooded areas	Likely
Elanoides forficatus	Swallow-tailed kite	Special Concern	Rivers and swamps	Marginal
Haliaeetus leucocephalus	Bald eagle	Endangered	Rivers and lakes	Marginal
Aquila ehrysaetos	Golden Eagle	Endangered	Wooded areas	Marginal
Falco columbarius	Merlin	Special Concern	Beaches, marshes, and open areas	Positive
Pandion haliaetus	Osprey	Endangered	Fresh and brackish marsh	Likely
Laterallus jamaicensis	Black rail	Special Concern	Brackish marsh	Likely
Florida coerulea	Little blue heron	Special Concern	Swamps and fresh marsh	Positive
Nycticorax nycticorax	Black-crowned night heron	Special Concern	Salt marsh	Likely
Mycteria americana	Wood stork	Special Concern	Swamps and marshes	Likely
Dendrocopos borealis	Red-cockaded woodpecker	Endangered	Pine flatwoods	Marginal
Aimophila aestivalis	Bachman's sparrow	Special Concern	Pine hardwoods	Likely
Lasiurus floridanus	Yellow bat	Special Concern	Wooded areas	Marginal
Sylvilagus palustris palustris	Marsh rabbit	Special Concern	Marshes	Likely
Seiurus carolinensis fuliginosus	Bayou grey squirrel	Special Concern	Wooded areas	Marginal

Source: Environmental Science and Engineering, Inc., 1977.

Table B.E.8. List of Plants (Endangered, Threatened, or Species of Special Concern) Which May Occur on the Proposed Plant or Quarry Sites

Scientific Name	Common Name	Status	Habitat	Likelihood of Occurrence
PLANT SITE				
Epidendrum conopseum	Tree orchid	Endangered	Rich bottoms	Marginal
Ilex amelanchier		Endangered	Swamp woodland	Marginal
Psoralea simplex		Endangered	Low, wet pinelands	Marginal
Rhyncospora crinipes		Endangered	Flatwoods	Marginal
Canna flaccida		Threatened	Pine savannah	Marginal
Cleistes divaricata	Spreading pogonia	Threatened	Bogs, open low woods	Marginal
Coreopsis gladiata		Threatened	Bogs	Marginal
Hypericum nitidum		Threatened	Low pinelands	Marginal
Ludwigia arcuata		Threatened	Marshes	Likely
Scutellaria alabamensis	Skull cap	Threatened	Moist clearings in oak-pine flats	Marginal
Warea sessiliflora		Threatened	Pinelands	Marginal
Eriocaulon texense	Pipewort	Threatened	Bogs	Marginal
Habernaria integra	Yellow fringeless orchid	Threatened	Pine barrens	Marginal
Lycopodium flabellifarme	Running pine	Threatened	Dry slopes	Marginal
Sabatia foliosa		Threatened	Sandy, peaty, low areas	Marginal
QUARRY SITE				
Isotria spectabilis	Pogonia	Special Concern	Hardwood slopes	Positive

Source: Environmental Science and Engineering, Inc., 1977.

Table B.E.9. List of Vertebrates (Endangered, Threatened, or of Special Concern) Which Are Known or Expected to Occur on or in the Vicinity of the Proposed Quarry Site, Monroe County, with their Preferred Habitats and Likelihood of Occurrence

Scientific Name	Common Name	Status	Habitat	Likelihood of Occurrence
Phaeognatus hubrichii	Redhills salamander	Endangered	Streambanks	Marginal
Alligator mississippiensis	American alligator	Threatened	Ponds and fresh marsh	Positive
Crotalus adamanteus	Eastern diamondback rattler	Special Concern	Pine flatwoods	Likely
Gopherus polyphemus	Gopher tortoise	Threatened	Pine-oak and sandhill communities	Marginal
Accipiter cooperii	Cooper's hawk	Special Concern	Pine-oak hardwoods, hardwood bottomlands, pastures	Likely
Accipiter striatus	Sharp-shinned hawk	Special Concern	Any habitat	Likely
Aquila chrysaetos	Golden eagle	Endangered	Wooded areas	Marginal
Buteo lineatus	Red-shouldered hawk	Special Concern	Wooded areas	Positive
Elanoides forficatus	Swallow-tailed kite	Special Concern	Rivers and swamps	Marginal
Haliaeetus leucocephalus	Bald eagle	Endangered	Rivers and lakes	Positive
Florida caerulea	Little blue heron	Special Concern	Swamps, ponds, and bottomlands	Positive
Mycteria americana	Wood stork	Special Concern	Swamps and marshes	Positive
Aimophila aestivalis	Bachman's sparrow	Special Concern	Pine hardwoods	Likely
Sorexl longirostris	Southeastern shrew	Special Concern	River, floodplain, and swamps	Likely
Myotis lucifugus	Little brown bat	Special Concern	Culverts and beneath	Marginal

Source: Environmental Science and Engineering, Inc., 1977.

Individual Species Discussion

Plants

Large Whorled Pogonia (Species of Special Concern)--*Isotria verticellata* is a yellowish green and purple wild orchid. It is found on moist hardwood slopes and stream margins.

Birds

Bald Eagle (Endangered)--*Haliaeetus leucocephalus* was a common breeding winter resident on the Gulf Coast. Wintering eagles are found along rivers and near bodies of water; however, since 1960 the populations have declined because of pesticide poisoning, illegal shooting, and human disturbance.

The bald eagle is likely to occur in the vicinity of the plant site and along the Alabama River at the quarry site; however, no nests were found at the plant or quarry site. A recent killing of a bald eagle near the quarry site was reported.

Golden Eagle (Endangered)--Although numbers of golden eagle (*Aquila chrysaetas*) are low, they are regularly sighted in Alabama during the winter. Occasionally the birds occur in more settled areas where there are livestock and waterfowl. Illegal shooting and pesticides have contributed to their decline. Their occasional presence at the proposed plant and quarry sites is possible.

Osprey (Endangered)--*Pandion haliaetus* which lives near water and feeds on fish, was a common migratory species throughout Alabama and was also a fairly common breeding species on the Gulf Coast. The primary cause for its decline is pesticide poisoning. Although nests were not found on either site, ospreys have been seen in the vicinity of the plant site but are unlikely to occur on and around the quarry site.

Wood Stork (Species of Special Concern)--Mycteria americana is the only American representative of the stork family (Ciconiidae). It is a large white bird locally common in southern swamps, freshwater marshes, and ponds; especially in the coastal plain of Alabama. The present population appears to be declining throughout Alabama (Imhof, 1976; Keeler, 1976). The wood stork has been frequently reported in both Monroe and Mobile counties. It is likely to occur at the plant site, although it was not seen. A wood stork was observed in the hardwood bottomlands of the quarry site, and is likely to occur in and around the ponds.

Red-Shouldered Hawk (Species of Special Concern)--Buteo lineatus is a permanent breeding resident throughout Alabama (Imhof, 1976). Breeding pairs are usually found in large tracts of forested lands, with more pairs frequenting tracts of bottomland hardwoods. The reasons for the decline of this species include habitat destruction and pesticide poisoning. One red-shouldered hawk was observed at the quarry site and they are likely to occur in the vicinity of the plant site.

Cooper's Hawk (Species of Special Concern)--Accipiter cooperii was a common permanent breeding resident throughout Alabama in moderately wooded areas. It nests in secluded woods, more often in pine than in hardwoods. Its preferred habitats are pine hardwoods and the edges of other woods. Its food is primarily birds, including robins, towhees, and meadowlarks; it will also prey on poultry. Since 1955 its numbers have been decreasing rapidly, probably because of pesticide poisoning. It is more likely to be found on the proposed quarry site than the plant site.

Merlin (Species of Special Concern)--Falco columbarius is an uncommon migrant and winter resident throughout Alabama, with most birds wintering near the Gulf Coast (Imhof, 1976). Shooting, pesticide poisoning, and other human disturbance are probably the major limiting factors. Suitable habitat (relatively open areas) is found in and around the plant. One merlin was observed in the marsh area at the plant site during the fall survey. It is unlikely to occur at the quarry site.

Sharp Shinned Hawk (Species of Special Concern--Accipiter striatus is a small hawk which is found in almost any habitat. During breeding season it prefers wooded hilly areas, and it builds large nests in pines. This species feeds primarily on small birds. Its numbers have declined, probably because of pesticide poisoning. The sharp shinned hawk is likely to occur at the quarry site and is unlikely to occur at the plant site.

Swallow-Tailed Kite (Species of Special Concern)--Elanoides forticatus is a large black and white hawk with a swallow-like tail. It is an inhabitant of rivers, swamps, open forests, and freshwater marshes. Its primary foods are insects, snakes, frogs, and other small animals. The decline of the swallow-tailed kite is attributed to pesticide poisoning and the decline of available river swamps. This hawk is unlikely to occur at either the plant or quarry site.

Black-Crowned Night Heron (Species of Special Concern)--Nycticorax nycticorax, one of the stockier herons, frequents salt marshes and feeds on crawfish, crabs, frogs, mice, grasshoppers, and other insects. It breeds in the Mobile Bay area and may utilize the marshes of the plant site. It frequents the same habitat as the yellow-crowned night heron (Imhof, 1976) seen at the plant site. Loss of wetlands in the coastal areas of Alabama has restricted the habitat of this species.

Little Blue Heron (Species of Special Concern)--Florida caerulea is a medium-size heron that frequents lake shores, swamps, bottomlands, and islands. It nests in colonies in these same habitats, and it feeds primarily on aquatic animals. This heron was observed in the marshes of the proposed plant site and in the ponds of the quarry site. It is also likely to occur in the floodplain forest and hardwood bottomlands of the quarry site.

Black Rail (Species of Special Concern)--Laterallus jamaicensis is a secretive bird inhabiting wet meadows and salt marshes of coastal areas. Destruction of wetland habitats has been the major factor in its decline. Suitable habitat exists at the plant site.

Red-Cockaded Woodpecker (Endangered)--Dendrocopus borealis is confined to mature pinelands and nests only in living pines which have been infected by a fungal disease known as "red heart." This bird is resident in southern pine forest throughout much of the southern Atlantic and Gulf states, including most of Alabama south of the Tennessee River. The decline of this species is due to its specialized habitat requirements conflicting with current widespread forestry practices such as intensive even-aged management in pine forests and culling of substandard trees (Imhof, 1976). If the nest trees are left undisturbed, the survival of the red-cockaded woodpecker will continue.

Monroe County is not known to contain any red-cockaded woodpecker population. Although no evidence of this bird has been observed on the proposed quarry site, likely habitat does occur in some of the more mature pine forest.

Mottled Duck (Threatened)--Anas fulvigula maculosa closely resembles the black duck in appearance and is one of the few non-migratory ducks. The mottled duck occurs in the Gulf coast areas of Mexico, Texas, Louisiana, and Alabama, with accidental distribution in Florida, Kansas, and Colorado. Its main breeding range is located in Texas and Louisiana and includes fresh, brackish, and salt marshes as favored habitats. Additional breeding areas include scattered locations around Mobile Bay (Imhof, 1976).

The preferred nesting sites for the mottled duck are coastal marshes in Spartina grasses. The bowl of the nest, which may be several inches above the ground and is usually raised above inundating waters, is concealed overhead with grasses or baccharis bush. Protection of nesting areas and preservation of wetlands are the best means to insure the survival of this species.

Although these ducks have never been reported near the plant site, Imhof (1976) reported them from several nearby locations. Likely habitat occurs along the lower portions of the North Fork Deer River.

Backman's Sparrow (Species of Special Concern)--*Aimophila aestivalis* is a permanent resident in suitable habitat in Alabama. It breeds in pine and scrub-oak woods. Habitat destruction and human encroachment have contributed to its decline. There is suitable habitat for this sparrow at both the plant and quarry site.

Mammals

Southeastern Shrew (Species of Special Concern)-- *Sorex longirostris longirostris* is a small insectivorous mammal found in river floodplains and swamps with an abundance of litter and thick understory. It is likely to occur in the floodplain forest and hardwood bottomlands of the quarry site.

Little Brown Bat (Species of Special Concern)--*Myotis lucifugus* is a medium-sized bat which ranges down to south central Alabama. It is a cave bat of forested areas but it also uses attics, old houses, and other cave substitutes. Loss of suitable habitat is major reason for concern. It may occur in the old buildings and other structures of the quarry site.

Florida Yellow Bat (Species of Special Concern)--*Lasiurus floridanus* is a tree bat whose primary range is in Florida. One specimen has been found in Mobile County (Dusi, 1976). Little information is available on its occurrence in other parts of Alabama.

Bayou Gray Squirrel and Marsh Rabbit (Species of Special Concern)--Both the bayou gray squirrel (*Sciurus carolinensis fuliginosus*) and the marsh rabbit (*Sylvilagus palustris*) have limited occurrence in southern

Alabama. The bayou gray squirrel is found throughout southern Louisiana (Lowery. 1974). It may occur in southern Mobile County and is usually found in close association with hardwood swamp forests. Because of the recent logging of the plant site. its likelihood of occurrence is marginal.

The limited range of the marsh rabbit in Alabama extends from the southeastern corner of the state westward to Mobile Bay. This species is an inhabitant of wet bottomlands, swamps. and marshes. As with the bayou gray squirrel. the status of the marsh rabbit in Alabama is uncertain (Mount, 1976). There is suitable habitat for the marsh rabbit at the plant site.

Reptiles

American Alligator (Threatened)--Alligator mississippiensis inhabits marshes and swamps throughout the coastal states in the southeast and occurs regularly along the lower Alabama River. Although alligator populations originally declined because of heavy poaching and habitat destruction. populations in most of the southeastern United States have recovered in recent times. Consequently. the U.S. Fish and Wildlife Service (1977) recently issued a rule reclassifying the alligator from endangered to threatened for much of its range, including all of Alabama.

General protective measures for the alligator include enforcement of anti-poaching laws and preservation of wetland habitats. Currently, stream channelization and other drastic alterations of natural waterways and drainage of wetlands constitute one of the major limiting factors.

Alligators are rare in the sections of the Alabama River adjacent to the proposed quarry site (Boone, 1977). A few alligators are sighted each year near the confluence of Randons Creek and Lovetts Creek. At the plant site the marshes offer suitable habitat. One alligator in the 18 to 24 decimeter (6 to 8 foot) class was sighted on several occasions in the North Fork Deer River.

Gopher Tortoise (Threatened)--*Gopherus polyphemus* occurs commonly in the lower Coastal Plain, which includes the two sites. Its preferred habitats are pine-turkey oak or sandhill communities. A number of factors, including habitat destruction for building purposes and agriculture, have caused its decline. The range of this burrowing animal included the two sites in the past (Mount, 1975), but recent disturbances on the sites have lowered its likelihood of occurrence.

Alabama Red-Bellied Turtle (Threatened)--*Pseudemys alabamensis* is found only in the lower Mobile Bay drainage, from Little River, Baldwin, and Mobile counties southward. The optimum habitat is in fresh to moderately brackish water with abundant submergent aquatic vegetation (Mount, 1975). Although an occasional specimen is collected in saltwater habitats, this animal is not primarily a salt marsh inhabitant (Mount, 1976).

Currently, the North Fork Deer River offers some habitat for this aquatic turtle. Preservation of marshes in the Mobile Bay area and protection from trapping and shooting are the best protective measures.

Eastern Diamondback Rattlesnake (Species of Special Concern)--*Crotalus adamenteus* occurs in the lower Coastal Plain and Red Hills. It is found in a variety of terrestrial habitats, including pine-flatwoods, longleaf pine-turkey oak associations, and scrub. Drier places are preferred, especially forested areas interspersed with cropland and oldfield.

Suitable habitat occurs at both the quarry and plant site. Residents near the quarry site have observed this species. Its likelihood of occurrence at the plant site is marginal because of the recent logging and human activity in the area.

Black Pine Snake (Endangered)--Pituophis melanoleucus lodingi is confined to a small portion of southwestern Alabama and southeastern Mississippi. In Alabama, this species occurs mainly in the lower Coastal Plain and the Red Hills region west of the Alabama River. The range includes Mobile, Clarke, and Washington counties and possibly the southern portion of Choctaw (Mount, 1975). There is little known about the habits of this sub-species but it is suspected to occur in proximity to gopher tortoise burrows (Conant, 1975). As with other snakes associated with tortoise burrows, the practice of snake collectors pouring gasoline into these burrows would have deleterious effects on black pine snakes. Clearing of forest land reduces the habitat for this animal. An inhabitant of areas with sandy soils, it might occur on upland habitats of the plant site, although recent logging reduces the chance of its occurrence.

Pine Woods Snake (Species of Special Concern)--Rhadinaea flavilata inhabits damp pine flatwoods on the lower Coastal Plain of the southeastern states. It is usually encountered within or under rotting logs, stumps, or some other sheltering object (Mount, 1975). Destruction of its habitat is the greatest threat to the continued survival of this snake. This species has been recorded in Baldwin, Mobile, and Washington counties. Some areas on the north side of the North Fork Deer River are likely habitat for the pine woods snake although recent clearing of the area reduces the probability of its occurrence at the plant site.

Amphibians

River Frog (Species of Special Concern)--Rana heckscheri inhabits mixed swamp and streams on the lower Coastal Plain of southern North Carolina, South Carolina, Georgia, Alabama, Mississippi, east Texas, and Florida. Preferred habitat, at least in Alabama, is in the swampy margins, especially titi swamps, of smaller streams and the edges of shallow bodies of water (Mount, 1975). Land-clearing, drainage activities, and pollution of waterways are major factors contributing to the demise of this ranid.

This species has been recorded from localities in Baldwin, Mobile, Escambia, and Covington counties. Although none was observed in the Environmental Science and Engineering 1977 survey, it is possible that the river frog occurs along the margins of the marsh at the plant site.

Gopher Frog (Threatened)--Preferred habitat of the *Rana areolata servosa* includes the southern-most counties of Alabama. It is generally associated with the gopher tortoise. Land clearing is one of the major threats to this species. The recent logging and clearing of the plant site has lowered its likelihood of occurrence.

Red Hills Salamander (Endangered)--*Phaeognathus hubrichti* is known to occur in Butler, Conecuh, Covington, Crenshaw, and Monroe counties of Alabama (Schwaner and Mount, 1970). Typical habitat of this fossorial species is found on the slopes of mesic ravines dominated by hardwood forest. These shaded slopes have a relatively cool and moist microclimate and a layer of loamy, friable topsoil. Clear-cutting of these hardwood forests will eliminate these climatic conditions and, apparently, the populations of Red Hills salamander (Valentine, 1963).

The quarry site is just south of the known range of the Red Hills salamander but likely habitat does occur in some sections of the lower portion of Thompson Mill Creek (Marshalls Creek). Limited habitat is also found associated with Wolf's Creek and Milkhouse Branch. Field reconnaissance of preferred habitat revealed no Red Hill salamanders nor their characteristic burrows. The likelihood of occurrence is considered marginal.

Flatwoods Salamander (Endangered)--*Ambystoma eingulatum* inhabits low pine flatwoods dominated by slash pine and wiregrass. Important breeding habitats are shallow flatwood ponds and swamp. This salamander has been recorded in Mobile County. Suitable habitat exists at the plant site, but recent logging has reduced the likelihood of occurrence of this species. Clear-cutting and intensive mechanical site preparation of forest lands has threatened this species.

AQUATIC ECOLOGY

PLANT SITE

EXISTING ENVIRONMENT

The aquatic habitats at the plant site are North Fork Deer River and the barge canal. The few bogs on the site and the flora of the wide band of marsh along the creek are described in the Terrestrial Ecology section.

North Fork Deer River is a small meandering tidal creek about 6 meters (20 feet) wide as it crosses the center of the plant site. Estimated net flow is only 5.7 to 28 liters per second (.2 to 9 cfs). Nevertheless, because the river is shallow, the waters probably remain well mixed. Several industrial wastes are emptied into the upper reaches of the river; however, due to a peculiar feature of the river, water in the lower reaches is of relatively good quality. A raised area, of undetermined nature but perhaps resulting from an abandoned logging road, forms a small dam across the marsh as it crosses the Ideal Basic Industries property. There is no channel, and water seeps through this ridge which supports the low intermediate forest described in the Terrestrial Ecology section. This seepage markedly cleans the water, and the oil slicks and foul appearance prevalent in the upper marsh are absent from the lower part of the river. This ridge also marks the transition between brackish and freshwater marsh.

The straight barge canal was dredged through the marsh of the meandering Middle Fork Deer River, and the complete drainage of the Middle Fork flows through the barge canal. However, the depth of the canal prevents mixing, and oxygen levels in the deeper parts of the canal become especially low in summer (see Figure B.W.2 in Water Resources section). While fish may use the entire water column during winter and spring, stagnation develops in June or July after the spring rains. Duration of the stagnant conditions is variable but probably extends well into

October. Thus, for at least four months of the year, only the top 2 to 2.5 meters (6.6 to 8.2 feet) of the water column in the barge canal are really useful for fish and wildlife.

The effects of this stagnation are especially clear in the distributions of shrimp. In the spring brown shrimp (Penaeus aztecus) occur in Middle Fork Deer River (Table B.A.E.1) and also in the Theodore Barge Canal (Table B.A.E.2), although in reduced numbers. In the summer, brown shrimp are replaced by white shrimp (P. setiferus) in Deer River, but white shrimp do not appear in the barge canal.

Composition of trawl catches in Deer River (Table B.A.E.1) and the Theodore Barge Canal (Table B.A.E.2) is similar to that for other parts of Mobile Bay. Anchovies (Anchoa mitchilli), menhaden (Brevoortia patronus), spots (Leiostomus xanthurus) and Atlantic croakers (Micropogon undulatus) are abundant throughout Mobile Bay (Swingle, 1971) and have high commercial importance (Chermock, 1974). Mullet and blue crabs are other commercially important species common at the plant site (Environmental Science and Engineering, Inc., 1977), but they are not efficiently sampled by trawls. Gar and abundant killifishes were also observed. These results are in general agreement with an independent collection from the barge canal (Environmental Consultants International, 1976).

Mean monthly trawl catches were generally lower in the canal than in Deer River, although more croakers were taken from the canal. Most of the difference in mean monthly catches is explained by very low summer catches when the canal has oxygen-deficient bottom waters.

A 5-hectare (12-acre) oyster reef exists north of the site at Hollingers Island (May, 1971). Most of the oysters immediately south of the canal were removed in 1967, in response to plans for expansion of the canal, and no surveys have been conducted since then. Water pollution causes periodic closure of all reefs in Alabama (May, 1972); and most of

Table B.A.E.1. The More Abundant Fish Species in Monthly Trawl Catches from Middle Deer River, January, 1971, to May, 1972

	1971												1972					
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Mean
Salinity ppt	3.9	1.9	0.5	2.9	2.7	7.2	11.6	7.0	14.0	15.6	15.0	2.6	2.4	3.6	2.1	4.6	5.5	
Temperature °C	9.0	16.2	16.1	25.1	25.5	28.6	28.7	29.0	24.9	22.8	13.1	17.9	11.5	14.8	17.4	24.6	25.9	
SPECIES																		
Anchoa mitchilli	2	52	1307	495	61	55	512	970	680	44	135	21	233	7	84	485	180	313.4
Brevoortia patronus	0	0	954	770	0	0	12	0	0	0	0	0	0	0	1175	160	14	181.9
Penaeus aztecus	0	0	0	271	515	64	8	8	1	0	0	0	0	0	13	1040	65	116.9
Leiostomus xanthurus	0	45	73	170	168	9	0	0	0	1	1	1	37	5	98	20	61	40.6
Micropogon undulatus	2	10	39	27	174	11	1	2	0	1	1	6	19	1	0	110	29	25.5
Penaeus setiferus	0	0	0	0	0	85	251	54	28	0	0	0	0	0	0	0	0	24.6
Cynoscion arenarius	0	0	0	2	35	29	75	7	1	0	0	0	0	0	0	49	16	12.7
Palaemonetes vulgaris	0	0	0	0	2	4	0	0	1	0	14	1	7	0	0	0	2	1.9
Callinectes sapidus	0	2	1	0	0	4	0	0	0	1	7	0	1	0	1	0	1	1.2
Dorosoma petenense	0	1	15	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1.2
Rhithropanopeus harrisi	1	0	0	1	0	3	0	0	0	0	6	0	0	0	0	0	6	1.0

Source: Swingle and Bland, 1974.

Table B.A.E.2. The More Abundant Fish Species in Monthly Trawl Catches from Theodore Barge Canal, February, 1971, to May, 1972

	1971											1972					
	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Mean
Salinity ppt	2.1	1.8	3.0	3.3	13.4	13.3	8.3	13.4	16.8	17.0	4.8	3.0	7.5	2.7	6.2	7.2	
Temperature °C	15.2	15.0	24.6	26.1	27.7	29.3	29.9	27.3	23.9	14.1	16.5	9.5	11.1	18.7	25.3	25.3	
SPECIES																	
Micropogon undulatus	34	1825	458	215	0	0	0	0	0	4	1	56	4	108	18	52	174.2
Anchoa mitchilli	315	257	115	80	0	17	0	78	1	32	640	11	462	55	5	4	130.1
Leiostomus xanthurus	58	241	39	21	0	0	0	0	0	0	0	23	2	5	0	0	24.4
Penaeus aztecus	0	0	0	7	66	0	0	0	0	0	0	0	0	1	128	0	12.6
Brevoortia patronus	2	166	8	1	0	0	0	0	0	0	0	1	16	2	0	0	12.3
Cynoscion arenarius	0	0	13	50	0	0	0	0	0	0	0	0	0	0	1	11	4.7
Chloroscombus chrysurus	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0.6
Palaemonetes vulgaris	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0.3
Arius felis	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0.2
Dorosoma petenense	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0.2

Source: Swingle and Bland, 1974.

northern Mobile Bay, including the area of Deer River, is permanently closed to shellfishing (U.S. Army Corps of Engineers, Mobile District, 1977).

Swingle (1971) and Christmas, et al. (1973), have surveyed the invertebrates of Mobile Bay, but sampling near the plant site (Environmental Consultants International, 1976) was too cursory to allow any comparison with other sites in Mobile Bay.

In summary, available data suggest that the aquatic fauna of Deer River is comparable to that of other marshy creeks bordering Mobile Bay. The Theodore Barge Canal has a reduced fauna, largely because low flow rates relative to depth and inadequate mixing result in stagnation and oxygen depletion during the summer.

PROJECTED 1992 ENVIRONMENT

Marshes reduce water flow and cause deposition of sediment which fills in the marsh and gradually converts it to dry land. However, this process is slow enough that no marked changes from present conditions should be noticeable by 1992.

Cumulative effects of the many pollutants presently released into North Fork Deer River could lead to a deterioration of the river and marshes by 1992. However, the probability of this situation cannot be estimated, especially without a detailed knowledge of the pollutants involved.

Construction of the Theodore Ship Channel and Barge Canal Extension during the next few years will result in extensive dredging and deepening of the canal bottom. The effects of this project should be to create a larger and deeper region of low or no oxygen in the channel.

Barring any further developments affecting the Deer River or barge canal, it is expected that the aquatic fauna in 1992 will be similar to existing fauna.

QUARRY SITE

EXISTING ENVIRONMENT

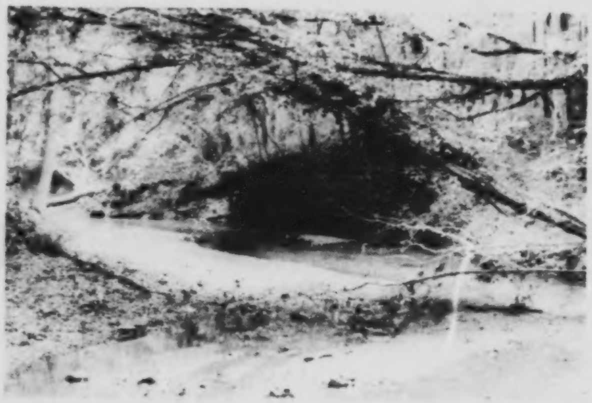
Aquatic habitats at the proposed quarry site consist of the Alabama River, which forms the western boundary of the property, and three main permanent streams, which empty into the Alabama River. Water quality and the streambeds have been described in the Water Resources section, and the vegetation in the Terrestrial Ecology section. To summarize this information, Thompson Mill Creek (also known as Marshalls Creek) (Figure B.A.E.1) and Hollinger Creek (Figure B.A.E.2) have good quality hard water. The flow gradient is rather steep (approximately 0.9 percent), and streambeds consist of sands or coarser materials. Randons Creek (Figure B.A.E.3) is the largest stream and has a flow gradient of only 0.45 percent, with some silt near the mouth. Water is soft and of generally good quality, but it shows some effects of runoff from agricultural and urban development at Frisco City. It is expected that the present rapid conversion of most of the site to improved pasture will lead to some deterioration of water quality, especially in the two smaller creeks.

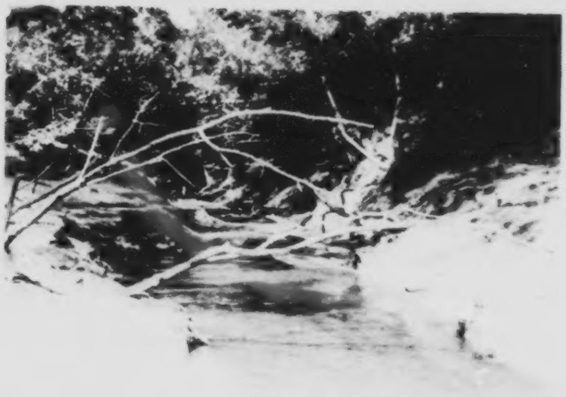
The property is on the convex side of a bend in the Alabama River. High bluffs overlook the river, and there is very little floodplain either on the river or on the tributary creeks. There is no permanent standing water on the site.

Aquatic Fauna

Fishes

Fishes of the lower Alabama River system are quite similar to those of the Tombigbee/Mobile/Tensaw Rivers systems with the exception of those marine or estuarine forms which inhabit the lower reaches. Like the Tombigbee River, the Alabama is populated by larger current-loving species in the main channel, numerous small fishes along the banks and in sheltered locations, and a great number of small stream or brook forms in the tributary streams. Normally many forms which inhabit tributaries





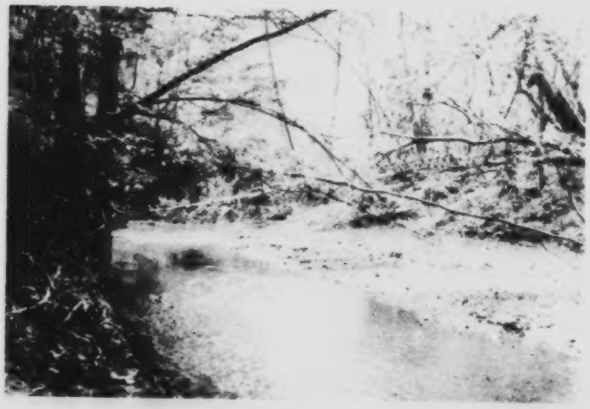


Figure B.A.E.1
PHOTOGRAPHS OF HABITAT
(THOMPSON MILL CREEK)

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

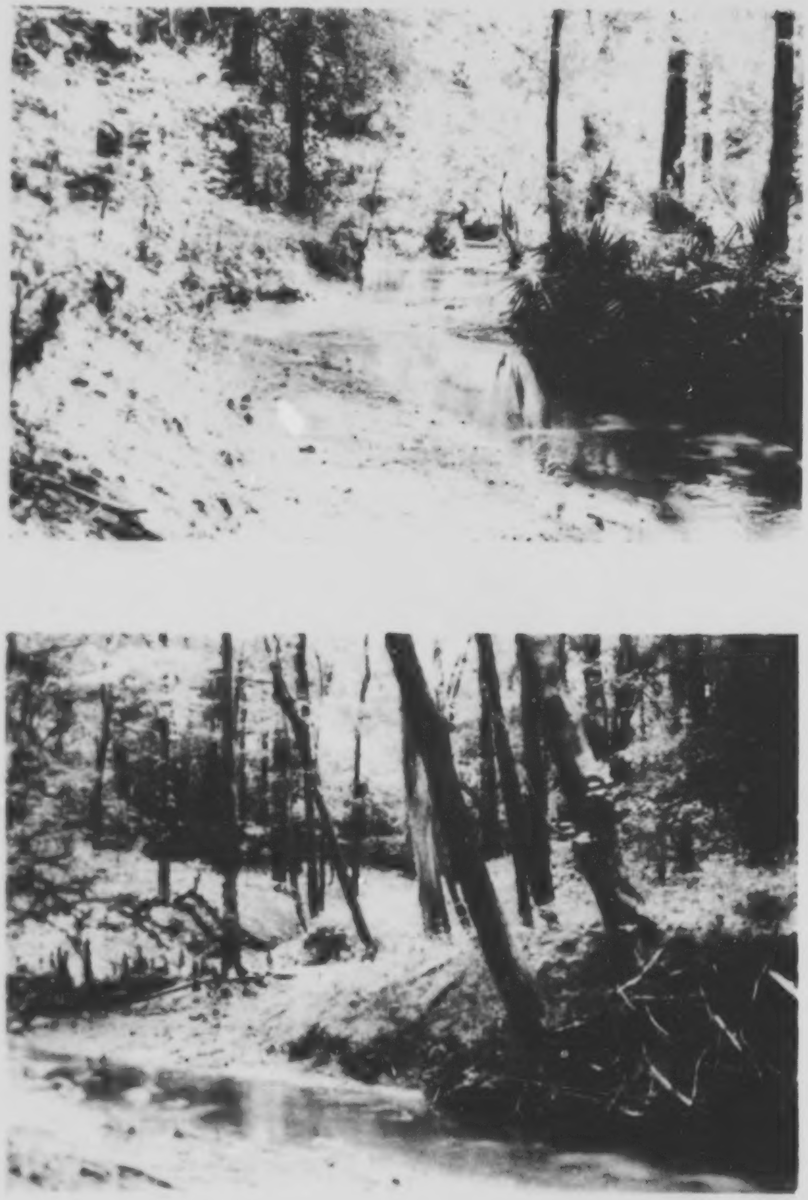


Figure B.A.E.2
PHOTOGRAPHS OF HABITAT
(HOLLINGER CREEK)

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

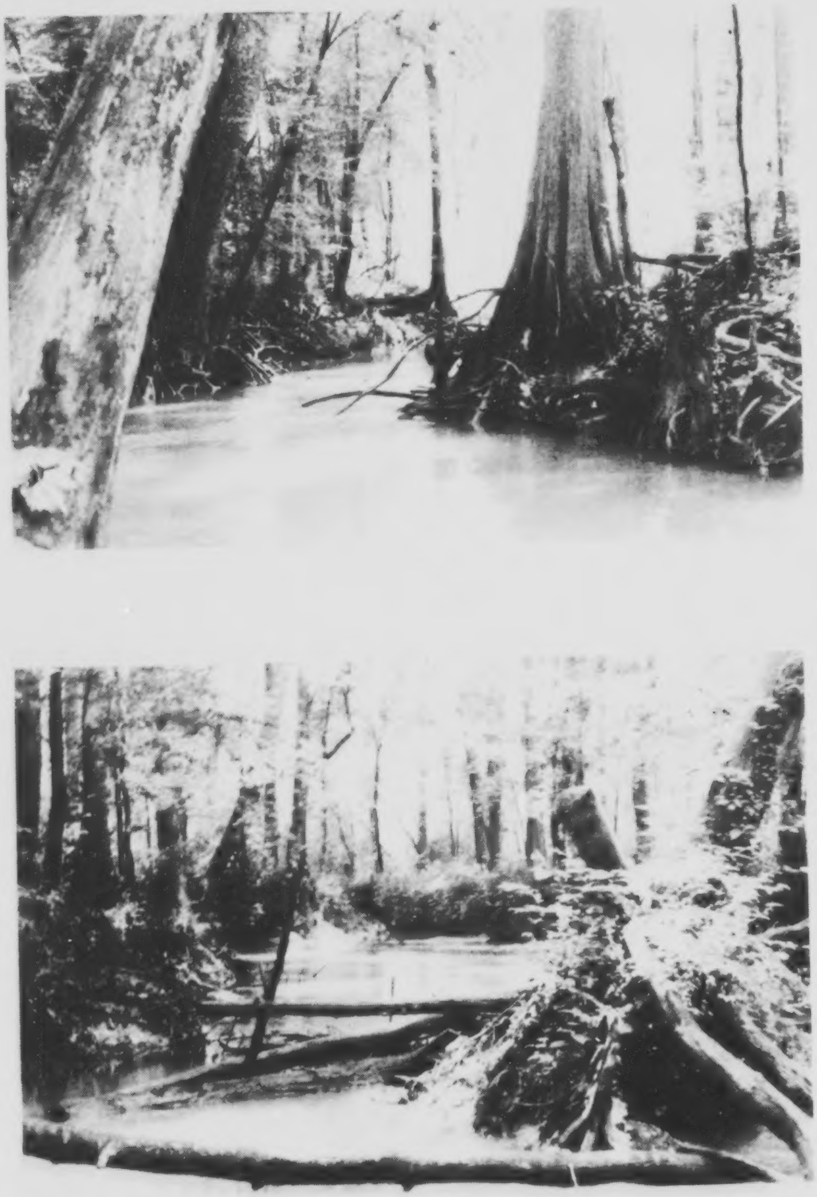


Figure B.A.E.3
PHOTOGRAPHS OF HABITAT
(RANDONS CREEK)

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

such as those found on the quarry site are similar to headwater or upper Alabama River forms. The mouths of all of the streams on the site could have any of the listed species (see Table B.A.E.3) depending upon the season and the existing water conditions.

Tributary streams to the Alabama at the level of the quarry site were examined during a low water period following extensive spring flooding and general high water conditions. Hollinger and Thompson Mill (Marshalls) creeks had insufficient water to maintain large riverine species, and the young of larger river fishes, such as carp, carpsuckers, catfish, buffalo, sturgeon, or drum, were not observed.

Data for these tributaries are quite limited for this stretch of the Alabama River. Holley Creek and several by-pass loops, as well as the mainstream Alabama (several miles south of the quarry site), were examined as part of a special study of the Tennessee-Tombigbee Waterway (Shipp and Hemphill, 1974). The results of this rather exhaustive sampling effort help to clarify the relative abundance of fishes which might commonly be expected from the Alabama River below Claiborne Lock and Dam (see Table B.A.E.3).

Numerical abundance for the 20 most prevalent species was examined for both the unaffected portion of the river and the by-passed loops. Minnows and shad dominate the top ten species, whereas catfishes and centrarchids were the most significant contributors to the next ten species.

Fishes collected from Holley Creek, a larger tributary to the Alabama River and similar to Randons Creek to the south of the immediate site, are listed in Table B.A.E.3. In this creek there are an array of species typical of moderate-sized, mid-south and southern streams. All trophic levels are represented and every available creek habitat is used by such an assemblage of fishes. With few exceptions, any of these fishes may use the stream throughout their entire life history.

Table B.A.E.3. Relative Abundances of Fishes in Cutoff Oxbows and in Adjacent Main Channel of Alabama River at I and II

Scientific Name	I. Oxbow	I. Main Channel	II. Oxbow	II. Main Channel
Amia calva*	0		2	
Lepisosteus oculatus*	35	18	29	
Lepisosteus osseus*	0		4	
Alosa chrysochloris	3		30	
Dorosoma cepedianum*	33	19	77	12
Dorosoma petenense*	320	5	1,578	1
Esox niger*	0		1	
Anchoa mitchilli	53	13	81	11
Hiodon tergisus	6		1	
Anguilla rostrata*	12		6	
Ericymba buccata	2		1	
Hybognathus hayi	1		0	
Hybognathus nuchalis	3,093	1	974	2
Hybopsis storeriana	223	8	710	4
Notemigonus crysoleucas	0		1	
Notropis atherinoides	163	10	56	15
Notropis edwardraneyi	307	6	35	18
Notropis emiliae*	3		1	
Notropis longirostris	0		1	
Notropis sp.*	631	2	809	3
Notropis texanus*	351	3	72	14
Notropis venustus*	330	4	230	6
Pimephales vigilax	4		33	20
Carpiodes sp.	3		2	
Carpiodes velifer*	36	17	24	
Minytrema melanops*	1		0	
Moxostoma erythrurum	1		0	
Moxostoma poecilurum*	14		49	16
Ictalurus furcatus*	52	14	34	19
Ictalurus punctatus*	242	7	589	5
Pylodictus olivaris	29	20	17	
Aphredoderus sayanus*	1		2	
Strongylura marina	6		5	
Fundulus olivaceus*	0		1	
Gambusia affinis*	3		0	
Labidesthes sicculus	1		0	
Mugil cephalus*	15		26	
Morone chrysops*	1		2	
Morone mississippiensis	6		0	
Morone saxatilis	1		0	
Ambloplites rupestris	1		0	
Lepomis gulosus*	3		24	

Table B.A.E.3. Relative Abundances of Fishes in Cutoff Oxbows and in Adjacent Main Channel of Alabama River at I and II (continued, page 2 of 2)

Scientific Name	I. Oxbow	I. Main Channel	II. Oxbow	II. Main Channel
Lepomis macrochirus*	83	12	136	7
Lepomis megalotis*	40	16	121	9
Lepomis microlophus*	7		21	
Lepomis punctatus*	3		4	
Micropterus salmoides*	46	15	76	13
Pomoxis annularis	1		0	
Pomoxis nigromaculatus*	86	11	134	8
Ammocrypta asprella	23		5	
Ammocrypta beanii	3		8	
Ammocrypta vivax	1		0	
Percina caprodes*	2		7	
Percina lenticula	0		2	
Etheostoma nigrum*	0		1	
Stizostidion vitreum	1		0	
Aplodinotus grunniens*	19		36	17
Trinectes maculatus*	171	9	120	10

*Indicates species also found in Holley Creek, a tributary of the Alabama River. Additional species in Holley Creek are:

Anguilla rostrata
Cyprinus carpio
Elassoma zonatum
Erimyzon tenuis
Esox americanus
Etheostoma fusiforme
Etheostoma proeliare
Fundulus notti
Labidesthes sicculus
Notemigonus crysoleucas
Notropis hypselopterus
Notropis roseipinnis
Notropis signipinnis
Noturus funebris
Noturus gyrinus
Percina nigrofasciata
Polydon spathula

Source: Shipp and Hemphill, 1974.

All of these fishes might be expected to be found in the lower reaches of Randons Creek, and at high water conditions in Hollinger and Thompson Mill (Marshalls) creeks. Fishes actually observed or seined from these last two creeks consisted of minnows, sunfish, bass, and darters. Under observed streamflow conditions in June, there was not sufficient water to support larger fishes.

The only species encountered which is not present in these lists was the Alabama hogsucker, *Hypentilinum etowenum*. Other than numerous minnows, the centrarchids, both bass and *Lepomis* sp., were the most prevalent. Sunfish nests were observed in every suitable soft-bottomed habitat. Although much of the habitat looked as if it would be suitable for darters, these fishes were never very abundant in collections.

Rare and Endangered Fishes

Several species of fishes have been listed by the Alabama Committee for the Identification of Rare and Endangered Species. While previously listed, the Alabama shad, *Alosa alabamae*, and the blue-spotted sunfish, *Enneacanthus gloriosus*, are no longer regarded as being in these critical categories.

The following species of rare and endangered fishes may be found in the vicinity of the quarry site.

Atlantic Sturgeon (Rare)--*Acipenser oxyrhynchus* is presently known from the Mobile-Tensaw River system, Alabama River, Mobile Bay, and Mississippi Sound. Limited data are available for this species, but individuals are captured in both the Tombigbee and Alabama rivers. Impoundments and hydrographic modifications of these two streams have seriously limited this species and may ultimately lead to its extinction.

Shovelnose Sturgeon (Endangered)--*Scaphirhynchus platorynchus* is habitat specific in its adaptations for feeding and spawning on current-swept sand and gravel beds. Limited populations currently exist in lower portions of the Alabama and Tombigbee rivers. Completion of proposed projects on both of these rivers may limit the species to the Cahaba River (Alabama River System).

Blue Sucker (Status Undetermined)--Cycleptus elongatus is widespread in the Mobile and Alabama river systems. Spawning success is based on availability of clean swept substrates in larger rivers. Although this species prefers flowing rivers, it can survive in diminished numbers in reservoirs.

Crystal Darter (Threatened)--Ammocrypta asprella is regarded as having been widely extirpated from the central United States. It is regarded as being in serious trouble in the Alabama River in the vicinity of the quarry site. It appears to be intolerant of siltation and eutrophication (Boschung, 1976). This species is an inhabitant of large sandy creeks and rivers and is usually collected in strong currents flowing over gravel or sand bottoms (Smith-Vaniz, 1968).

Freckled Darter (Threatened)--Percina lenticula like the crystal darter, sturgeon, and blue sucker, prefers strong currents over sand or gravel bottoms. It has been reported from the lower Alabama River (Ramsey, 1975), and records suggest that the species may enter the lower courses of larger tributaries at least temporarily. It could inhabit waters adjacent to the quarry site. It is presently regarded as threatened and on the verge of endangered status, although further work is required to fix its status (Boschung, 1976).

Benthic Macroinvertebrates

Data concerning the aquatic invertebrate populations of the waters in the vicinity of the quarry site are quite limited. Sample dredging along the quarry site side of the Alabama River, as well as transects across the river, failed to produce identifiable benthic macroinvertebrates. Even though there were isolated pockets of finer materials, species of the burrowing mayflies (such as Hexagenia sp.) were not detected.

Benthic macroinvertebrates which might be expected from this level of the Alabama River may be inferred from a previous study and compilation of existing data from various sources for the Tombigbee and Mobile rivers (see Table B.A.E.4). The apparently greater numbers and variety of forms is a reflection of the finer substrates and pockets of fines and mixed organic matter encountered in those streams as compared to the Alabama River at the quarry site vicinity.

The animals tentatively identified in the field are common to woodland gravel, sand, riffle/pool streams found throughout the midwest and southeastern United States. Some expected forms were not found; however, it is possible that some forms were missed because not all sites were sampled. It was expected that many more chironomids and annelids and a different assortment of mayflies would be found. Experiences at the same level on the Tombigbee River suggested that Sphareriid and Corbiculid clams would be found, but these were conspicuously absent from the samples. Gastropods were locally abundant, however.

Burrowing mayflies were not observed in the dredge samples; however, they may be recovered from the artificial substrate samplers. The heptageniid genus Stenonema, which is normally plentiful in these kinds of streams, was not particularly abundant. Isonychia, however, was extremely abundant at all stations where gravel was plentiful. This finding probably reflects the substrate type because Stenomena prefers larger rock, rubble, and current than Isonychia.

Hydropsychid caddisflies were rather spotty in their distribution but were plentiful and probably reflect the finely divided particulate organic matter which was prevalent throughout all systems. The absence of larger rock and rubble prevented greater development of this group. However, rock case building caddisflies were much more plentiful in Thompson Mill Creek (Marshalls) than in the others. This probably

Table B.A.E.4. Benthic Macroinvertebrate Collections (page 1 of 4)

Species	ESE Sampling, All Locations (Mobile River)	U.S. EPA, 1972-1973	Swingle (All Stations, Tombigbee River), 1965-1966	Swingle (All Stations, Mobile River), 1965-1966	Bayne and Lawrence (Upper Mobile River), 1974	ESE (Alabama River, at Quarry Site)	ESE (Thompson Mill, Hollinger, and Randons Creeks)
Hydroida							
Cordylophora lacustris		●					
Nematoda			●			●	●
Polychaeta	●			●			
Nereis sp.	●						
Hypaniola sp.	●						
Ampharetid sp.	●						
Oligochaeta			●	●		●	●
Lumbriculus variegatus		●					
unidentified		●					
undetermined					●	●	●
Hirudinea							
Glossiphoniidae	●						
Gastropoda*			●	●		●	3-6
Corticula manilensis	●	●					
Physa heterostropha					●		
Physa sp.		●			●		
Lymned sp.					●		
Sphaeriid sp.	●						
Isopoda						1-2	1-2
Cyathura polita	●						
Asellus sp.					●		
Amphipoda			●	●		1-3	1-2
Gammarus sp.	●				●		
Corophium sp.	●						
Hyalleal azeteca	●				●		
Decapoda							
Palaemonetes paludosus		●					
Machrobronchium ohione					●		
Ephemeroptera			●	●		3-5	3-5
Stenonema proximum		●					
Stenonema smithae		●					

Table B.A.E.4. Benthic Macroinvertebrate Collections (continued, page 2 of 4)

Species	ESE Sampling, All Locations (Mobile River)	U.S. EPA, 1972-1973	Swingle (All Stations, Tombigbee River), 1965-1966	Swingle (All Stations, Mobile River), 1965-1966	Bayne and Lawrence (Upper Mobile River), 1974	ESE (Alabama River, at Quarry Site)	ESE (Thompson Mill, Hollinger, and Randons Creeks)
Ephemeroptera (continued)							
Stenonema sp.	●				●		
Hexagenia bilineata	●	●					
Hexagenia munda marilandica		●					
Toropus incertus	●						
Tricorythodes sp.	●	●					
Caenis sp.					●		
Blasturus					●		
Isonychia sp. A		●					
Callibaetis floridanus		●					
Odonata			●	●		4-5	6-8
Dromogomphus sp.	●	●					
Cordulegaster dorsalis		●					
Argia sp.		●			●		
Neurocordulia molesta		●					
Ischnura sp.					●		
Plecoptera			●			1-3	4-5
Neoperla clymene		●					
Hemiptera			●	●			
Ranatra sp.		●					
Rhemmatobates sp.		●					
Plea sp.					●		
Gerris sp.					●		
Belostoma sp.					●		
Coleoptera			●	●			
Agasides sp.					●		
Cyphon sp.					●		
Gyrinus sp.					●		
Gyrinus pachysomus		●					
Stenelinis sp.	●					1-2	1-2

Table B.A.E.4. Benthic Macroinvertebrate Collections (continued, page 3 of 4)

Species	ESE Sampling, All Locations (Mobile River)	U.S. EPA, 1972-1973	Swingle (All Stations, Tombigbee River), 1965-1966	Swingle (All Stations, Mobile River), 1965-1966	Bayne and Lawrence (Upper Mobile River), 1974	ESE (Alabama River, at Quarry Site)	ESE (Thompson Mill, Hollinger, and Randons Creeks)
Tricoptera*			●	●		5-8	5-8
Cyrnellus fraturnus and sp.	●	●					
Neureclipsis sp.	●	●					
Polycentropis sp.					●		
Hydropsyche orris	●	●					
Cheumatopsyche sp.	●						
Philaptomus sp.					●		
Hydroptila sp.		●					
Leptocella sp.		●					
Diptera †						●	●
Chironomidae			●	●		10+	40+
Alluandomyia sp.					●		
Ablabesmyia janta		●					
A. sp. 4 Smith		●					
A. sp.	●						
Pentaneurini undetermined					●		
Psectrocladius sp.	●						
Atherix varienata	●						
Bezzia sp.	●						
Coelotanypus concinnus		●					
Coelotanypus sp.	●						
Procladius culiciforinis		●					
Procladius sp.	●						
Nanocladias alternantherae		●					
Cricotopus sp. 2 Roback		●					
Cricotopus sp.	●						
Stenochironomus hilaris		●					
Stenochironomus sp.	●	●					
Stictochironomus sp.	●						
Pseudochironomus fulviventris		●					
Parachironomus sp.	●						
Paracladopelma sp.	●	●					
Paralauterboniella sp.	●						
Paratendipes sp.	●						

Table B.A.E.4. Benthic Macroinvertebrate Collections (continued, page 4 of 4)

Species	ESE Sampling, All Locations (Mobile River)	U.S. EPA, 1972-1973	Swingle (All Stations, Tombigbee River), 1965-1966	Swingle (All Stations, Mobile River), 1965-1966	Bayne and Lawrence (Upper Mobile River), 1974	ESE (Alabama River, at Quarry Site)	ESE (Thompson Mill, Hollinger, and Randons Creeks)
Chironomidae (continued)							
Polypedilum halterale	●	●					
Polypedilum parascalaenum		●					
Polypedilum illinoense		●					
Tanytarsus exiquus		●					
Tanypodinae sp.	●						
Pedionomus beckae		●					
Glyptotendipes lobiferus		●					
Dicrotendipes (prob. nervosus)		●					
Cryptochironomus ponderosus		●					
Cryptochironomus parafuluus		●					
Cryptochironomus sp.	●	●					
Tribelos jucundus		●					
Chironomini sp.	●						
Eukiefferiella sp.	●						
Lauderborniella sp.	●						
Nilothauma sp.	●						
Tribelos sp.					●		
Ceratopogonidae							
Palpomyia (nr. tibialis)	●	●				●	●
Chaboridae			●	●			
Chaoborus punctipennis	●	●					
Hydracarina	●		●	●		●	●
Collembola	●					●	●
Bryozoa	●		●	●		●	●

NOTES: * Numbers in the last two columns indicate the number of species present.

† Tabanids and Simuliids, as well as Megaloptera, were taken from tributaries.

Source: Environmental Science and Engineering, Inc, 1977.

reflects more stable substrate development and slightly better water quality. In each of the streams, several species such as Plecoptera spp. (stoneflies) show that water quality is good. Table B.A.E.4 also presents a tentative list of taxa which might be expected from the Alabama River and tributaries, based on existing literature and a knowledge of these types of stream systems.

Freshwater Mussels (Naiads)

Several species of pearly naiads from the Alabama River system are listed as rare or endangered. However, no beds or mussel shoals were found in the immediate vicinity of the quarry site.

PROJECTED 1992 ENVIRONMENT

If the proposed facility were not constructed, the land would continue to be cleared and developed for agricultural purposes. In 1974 the Soil Conservation Service developed a Soil and Water Plan for the McWilliams property. In that plan, 593 hectares out of 811 (1,465 acres out of 2,004) were slated for pastureland. Of the remaining 202 hectares (499 acres) of timber which were to be thinned to D+6 (pine) and D+10 (hardwoods), significant portions have already been clear-cut and seeded to pasture. Only 0.8 hectares (two acres) were designated as wildlife land (irrespective of the edge created by timbered drainages, swales, and small woodlots).

Based on the Environmental Science and Engineering 1977 inventory, over two-thirds of the northern property block has already been timbered, and conversion to pasture is occurring at a rapid rate. Within 15 years it is anticipated that the majority of the land will have been converted. Due to serious slope constraints in this area, large portions may be left timbered, or, if cut, will probably suffer serious erosional problems.

The original estimate of stock loading for the 811 hectares (2,004 acres) was 752 animal units. Considering the practices that have been observed, it is quite possible that the area is being planned and prepared for 1,500 to 2,000 animal units.

In 15 years it is expected that most of the two areas will have been almost completely cleared of timber and will support a high density of cattle [2.5 to 3.7 per hectare (1 to 1.5 per acre)]. With no further constraints, both streams (Hollinger and Thompson Mill) will continue to experience sedimentation, and the problems associated with cattle watering and wading (BOD and nutrients) will probably continue to degrade the water quality.

If the quarry is not opened, the lands of the northern block may be sold to other interests by Ideal Basic Industries, Inc. Although there is no way of predicting a definite land use, conversion to pasture appears to be most likely.

The runoff characteristics of the two possible land uses which are being discussed--timber and pastureland--are considerably different. Well-established forests trap and hold rainfall on leaves, stems, and trunks and in well-developed forest floor litter. Without contouring or terracing, gently sloping pastureland stores much less rainwater than timber. This difference results in different runoff hydrographs for the two land uses. A lower, more attenuated hydrograph followed by continued subsidy (drip and seep) is characteristic of timber, whereas a sharper, higher, and less attenuated hydrograph with relatively little subsidy following rainfall events is characteristic of pastureland. Higher velocities observed in the pasture (slope and length) tend to carry more sediment and other pasture-generated solids to watercourses.

If good pasture management practices are not implemented on this piece of property, the streams will experience sedimentation and increased BOD and nutrient loading by the year 1992. Siltation can be expected to create more soft-bottomed habitats which would favor burrowing forms (worms, chironomids, burrowing mayflies) over roots, rubble, sand, or gravel inhabitants. Filter feeders (Hydropsychid caddisflies, blackflies, etc.) may be expected to prosper so long as available attachment substrate remains exposed. The removal of trees and their detrital components, such as leaves, twigs, and bark, may eliminate the larger grazers and carnivores of the present system (mayflies, elmid beetles, stoneflies, dragon and damsel flies, and members of the Megaloptera). General decline in water quality as a result of BOD and/or nutrient loading can be expected to result in more facultative and pollution-tolerant forms replacing pollution-intolerant forms.

APPENDIX B. BASELINE

SOCIOECONOMICS

PLANT SITE: EXISTING ENVIRONMENT (1977)

REGIONAL ECONOMY

The socioeconomic assessment of the baseline environment will refer to three different geographic regions, corresponding to different types of assessment as follows:

Impact on economic conditions	Mobile SMSA (Mobile and Baldwin Counties)
Impact on community services, public facilities, local government revenue, generalized land use	South Mobile County (Census Tracts 65-73)
Localized impact on land use and land value	Hollingers Island area, to Theodore and Bellefontaine.

The Mobile area in the past has been the subject of several major economic studies. The most recent and comprehensive of these is "The Economy and Population of the South Alabama Region," published by the Southwest Alabama Regional Planning Commission (SARPC) in mid-1975. SARPC has also conducted additional analyses, and has forecast detailed population and land use as part of the Section 208 water quality planning effort. An additional planning study conducted for SARPC by an outside consultant has focused specifically on South Mobile County (Community Development Consultants, Inc., 1976).

The present discussion will summarize this material and will provide updated information where possible in order to focus upon recent trends and developments.

The Mobile economy historically has been linked to geographic factors and natural resources, namely the Port of Mobile, the Alabama River system, and the forest and agricultural resources of the hinterland. The Alabama River system, flowing into the Mobile River and Mobile Bay, includes the Tombigbee, Black Warrior, Coosa, Tallapoosa, and Alabama Rivers. The role of Mobile as a gateway to Alabama began with the construction of forts by the French in the early 18th century. Mobile first became prominent as a port in the early to mid-19th century when dredging operations by the U.S. government succeeded in deepening Mobile Bay. The primary cargo at that time was cotton. A considerable variety of commodities now pass through the Port of Mobile, which has linkage to rail, highway, and air carriers as well as to inland waterway traffic. The barge canal and dock areas are maintained at a depth of 12 meters (40 feet), which allows access by most types of oceangoing vessels.

The functioning of the Port of Mobile is critically dependent upon two public agencies: the Alabama State Docks Department and the U.S. Army Corps of Engineers. The State Docks Department is an agency of the State of Alabama which was formed more than 30 years ago to serve as a Port Authority, a port terminal operator, and an operator of railroads. The facilities maintained by the State Docks include 28 general cargo piers, a bulk commodity terminal, a public grain elevator, a dry bulk materials handling plant, a cold storage plant, a cotton warehouse, and 14 terminals on the inland waterway system. The Docks Terminal Railroad is operated as a link between the State Docks and four major trunk line railroads. The State Docks Department is also actively engaged in the promotion of industrial development, and has acquired substantial land holdings in Mobile County for lease or sale to industrial firms. In 1975, Alabama voters approved the issuance of up to $45 million in bonds for the improvement of State Docks facilities. The State Docks Department has recently released a 50-year plan which includes further development at the Mobile waterfront, McDuffie Island, Brookley, and Theodore, as well as improvement of the waterways linking these areas.

The Corps of Engineers is important to the Port of Mobile because of its responsibility for constructing and maintaining the waterways, locks, and dams that make up the water transportation system. Two current Corps of Engineers projects--the Tennessee-Tombigbee Waterway and the Theodore Ship Channel--are widely regarded as critical to the future economic development of the Mobile area.

The Port of Mobile has generated a substantial volume of ancillary activities in addition to the port operations per se. These port-related activities have been examined in some detail in a recent study entitled, "Economic Analysis of the Port of Mobile," which has attempted to establish the overall impact of the port on the Alabama economy (Dunphy and Chiang, 1974). The direct employment effects estimated in this study are presented in Table B.P.S.1. The total direct impact of the port in 1973 was approximately 42,000 jobs, of which slightly more than half can be assigned to the Mobile SMSA (Mobile and Baldwin Counties). These 22,849 local jobs would amount to over 16 percent of the total 1973 resident employment in the SMSA. Along with its direct impact, the port is responsible for very large secondary effects due to local purchases by port-related firms and the spending and respending of income received by their employees. The port study has estimated the long-term employment multiplier (ratio of total to direct employment impact of basic industries) as being 3.0 for the State of Alabama as a whole. A somewhat lower value, on the order of 2.5, would presumably be appropriate for the Mobile SMSA due to the greater economic leakages involved. Use of this multiplier value leads to the conclusion that in 1973 the port was directly or indirectly responsible for about 57,000 jobs in the Mobile SMSA, amounting to 41 percent of all resident employment.

Roughly two-thirds of the direct impact attributed to the port consists of employment by manufacturing firms. These include shipbuilding and repair establishments and a variety of tidewater manufacturers utilizing the port facilities for imports and exports. Many of these firms hold land leased from the State Docks Department. Other standard categories of employment affected directly by the port are transportation, Table B.P.S.1. Estimated Employment Impact of the Port of Mobile, 1973

	Number of Workers
Employment Located Primarily in Mobile SMSA	
Marine transportation	
Alabama state docks and steamship agencies	1,227
Piloting, launching, towing, and guard service	291
Stevedoring	2,840
Auxiliary marine services	384
Inland transportation	
Barge	156
Rail	840
Trucking, warehousing, and air transportation	368
Governmental and civic organizations	
Federal government	1,894
Local government and Chamber of Commerce	104
Tidewater industries	
Shipbuilding and repair	4,571
Tidewater manufacturers	10,174
(SUBTOTAL)	(22,849)
Employment Primarily Outside Mobile SMSA	
Non-tidewater manufacturing industries	16,003
Agriculture	3,142
(SUBTOTAL)	(19,145)
TOTAL, STATE OF ALABAMA	41,994

Source: Dunphy and Chiang, 1974.

government, trade, and to a small extent finance and other professional services. Port operations have expanded steadily over the years, with total tonnage increasing from 13.7 million metric tons (15.1 million short tons) in 1959, to 26.4 million metric tons in 1973, to 29.5 million metric tons in 1975. The annual rate of tonnage increase has been approximately 5 percent per year. Traffic on the Gulf Intracoastal Waterway, which passes through Mobile Bay, also has increased very rapidly, with the gains in tonnage between 1966 and 1975 amounting to 90 percent east of Mobile and 63 percent west of Mobile.

Table B.P.S.2 gives a detailed accounting of port tonnage in 1975, and thereby provides some important insights into the economic structure of Mobile and the hinterland which it serves. It is apparent that the port tonnage consists largely of primary materials that serve as inputs to industrial production, namely coal, metallic ores, petroleum, agricultural products, nonmetallic minerals, and forest products. This pattern is typical for water transportation as compared to rail, highway, and air transportation, but it is especially striking in the case of the Port of Mobile. Approximately 85 percent, by weight, of all imports from abroad consist of iron ore and other metallic ores and concentrates. The other commodities imported in significant amounts include coal, crude petroleum, chemicals, basic metal products, and bananas. About half of all exports consist of coal, with agricultural and grain mill products accounting for another 36 percent. Wood products, pulp, paper, chemicals, nonferrous minerals, iron and steel products, and miscellaneous machinery make up the remainder of exports. The volume of domestic coastwise traffic is fairly small relative to both foreign and internal traffic, and is accounted for largely by receipts of petroleum products and shipments of crude petroleum. Internal (river) traffic is quite varied, although petroleum products, iron ore, and agricultural commodities predominate. Local traffic is limited largely to shipment of marine shells. An overall characteristic of Port of Mobile cargo is that finished machinery and consumer products, with the exception of petroleum products, account for less than 1 percent of total traffic by weight.

Table B.P.S.2. Mobile Harbor Freight Traffic, 1975, in Thousands of Short Tons

		Foreign		Domestic Coastwise		Domestic Internal		
	Total	Imports	Exports	Receipts	Shipments	Receipts	Shipments	Local
Wheat	663	--	241	6	100	303	5	8
Corn	1,037	--	646	--	141	190	--	60
Soybeans	1,086	--	632	--	--	312	3	139
Other Agricultural and Fishery Products	313	79	205	--	14	7	8	--
Marine Shells, Unmanufactured	1,491	--	--	--	--	196	263	1,032
Iron Ores and Concentrates	7,180	4,781	--	--	--	--	2,399	--
Nonferrous Ores and Concentrates	2,042	1,946	34	--	--	54	8	--
Coal and Lignite	5,941	371	2,746	--	--	2,489	335	--
Crude Petroleum	4,959	189	--	--	2,409	22	2,302	37
Sand, Gravel, Crushed Rock	1,810	--	60	--	--	1,305	359	86
Clay	124	1	16	--	--	105	2	--
Unworked Stone and Other Nonmetallic Minerals	20	3	--	2	--	12	3	--
Flour, Feed, and Other Grain Mill Products	417	27	231	3	88	43	25	--
Other Food and Kindred Products	47	19	19	--	1	5	3	--
Logs and Pulpwood	119	--	--	--	--	119	--	--
Lumber, Timber, Posts, Poles	171	54	60	--	44	6	7	--
Furniture and Other Wood Products	58	16	23	--	14	5	--	--
Pulp	171	50	78	--	--	36	7	--
Paper and Paper Products	54	5	40	--	4	3	2	--
Sodium Hydroxide	144	--	--	--	--	144	--	--
Other Chemicals and Fertilizers	511	121	56	--	1	57	275	1
Gasoline	1,050	--	--	144	6	849	48	3
Jet Fuel	351	--	--	14	--	--	337	--
Distillate and Residual Fuel Oil	1,133	30	--	192	32	622	239	18
Asphalt, Tar, and Pitches	646	--	--	--	140	444	62	--
Other Petroleum and Related Products	32	--	--	--	1	18	13	--
Textiles, Apparel, Rubber, Plastic, and Leather Products	4	3	1	--	--	--	--	--
Building Cement	124	--	--	--	4	51	69	--

Table B.P.S.2. Mobile Harbor Freight Traffic, 1975, in Thousands of Short Tons (Continued, page 2 of 2)

	Total	Foreign		Domestic Coastwise		Domestic Internal		Local
		Imports	Exports	Receipts	Shipments	Receipts	Shipments	
Other Glass, Clay, Stone, and Nonmetallic Mineral Products	91	1	5	--	--	85	--	--
Pig Iron, Ferroalloys, Nonferrous Metals	114	90	--	--	--	9	15	--
Coke, Petroleum Asphalts, Solvents	54	--	54	--	--	--	--	--
Iron and Steel Shapes	102	55	1	--	1	29	16	--
Other Iron and Steel Products	104	16	62	--	11	13	2	--
Iron and Steel Scrap	157	--	133	--	1	11	12	--
Machinery, Transportation Equipment, Instruments, and Miscellaneous Commodities	133	39	62	2	2	15	13	--
TOTAL	32,453	7,896	5,405	363	3,014	7,559	6,832	1,384

Source: U.S. Army Corps of Engineers, Lower Mississippi Valley Division, 1975.

The manufacturing activities in metropolitan Mobile which are not specifically port-related tend to be linked closely to the region's natural resources. These include chemical, pulp, paper, ferroalloy, and wood products manufacturing firms, which together employ over 13,000 persons. Other manufacturing activities in the Mobile SMSA involve food and kindred products, textiles and apparel, machinery and various metal products, and a small amount of refined petroleum. Fishing activities in the bay and coastal waters, together with agriculture and forestry in upland areas, account for about 3,000 of the region's employees. In addition to these traditionally "basic" sectors, the Mobile economy receives substantial support from service-producing activities such as wholesale trade, finance, professional services, and state and federal government operations. As is discussed below, the role of these sectors in the post-1970 expansion has been particularly significant.

Table B.P.S.3 describes the Mobile SMSA employment by major industry group in the years 1960, 1965, 1970, and 1976. The figures refer to at-place employment (rather than employment of residents), and exclude agricultural workers, domestic workers, and self-employed persons. A significant aspect of Mobile's economic history indicated by Table B.P.S.3 is the period of stagnation which occurred roughly between 1965 and 1970. The cause was the phase-out of Brookley Air Force Base, which had been a major component of the region's economy. The roughly 15,000 civilian jobs which were lost at Brookley comprised more than 10 percent of total SMSA employment, and amounted to between one-fourth and one-third of the "economic base" of the region in the early 1960's. This loss was nowhere near offset by the steady expansion in manufacturing and port-related activities. The Brookley phase-out thus succeeded in restraining the expansion of services-producing activities, which were providing very large employment increases in most other Southeast metropolitan areas. Wage and salary employment in the Mobile SMSA rose dramatically after 1970, however. The 26 percent increase between 1970 and 1976 amounted to an annual compound rate of 4 percent per year. Virtually all sectors of the economy have participated in this recent expansion.

Table B.P.S.3. Wage and Salary Employment in the Mobile Area

	Non-Agricultural Wage and Salary Employment, in Thousands*			
	1960	1965	1970	1976
Manufacturing				
Lumber and Wood Products	2.4	2.3	1.9	2.1
Paper and Allied Products	6.2	6.9	7.7	7.6
Chemicals	1.8	2.2	2.6	3.3
Shipbuilding and Repair	2.8	3.6	4.2	3.8
Other Manufacturing	5.7	6.7	8.6	10.0
(Sub-Total)	(18.9)	(21.7)	(25.0)	(26.8)
Non-Manufacturing				
Construction	5.3	6.6	6.6	10.8
Transportation, Communications, Utilities	10.4	9.5	9.9	9.9
Trade	21.6	23.3	25.5	32.0
Finance, Insurance, Real Estate	4.3	4.3	5.0	6.0
Service and Miscellaneous	11.4	14.7	16.3	25.9
Government	26.7	25.9	16.7	21.3
TOTAL	98.6	106.0	105.0	132.7

* Excludes agriculture, forestry, and fishery employment, proprietors, and other self-employed persons including workers in private households.

Source: Alabama Employment Service, 1977

The relationship between jobs and resident workers in the Mobile SMSA is complicated by the fact that commuting into and out of the region is fairly significant. Table B.P.S.4 describes the commuting patterns that prevailed in 1960, 1970, and 1976. (In this and all subsequent tables dealing with employment, the data are intended to be consistent with the Census of Population employment definition, in order to facilitate analysis of worker/population relationships.) The major outside source of jobs for workers living in the SMSA is the shipyard operated by the Ingalls Division of Litton Industries, Inc., in Pascagoula (Jackson County), Mississippi. Employment at the Ingalls facility currently is well over 20,000 workers of whom an estimated 4,500 live in Mobile County (King, 1977). The various explanations that have been offered for this magnitude of commuting include: greater residential amenity and housing choice in Mobile County than in Jackson County; better access to major shopping facilities and other urban services; and better schools. Two other major flows of workers indicated in Table B.P.S.4 are the worktrips by Baldwin County residents to Mobile County (internal to the SMSA) and to the Pensacola area in Escambia County, Florida. Commutation into the Mobile SMSA from elsewhere involves relatively small numbers of workers from numerous counties in Alabama, Mississippi, and Florida.

Total out-commutation from the SMSA has increased from 3,185 workers in 1960, to 4,639 in 1970, and about 8,400 in 1976. In-commutation has remained fairly stable, from 2,000 to 2,500. Thus, the net volume of out-commuting from the SMSA (which equals the difference between resident workers and jobs) increased by about 2,650 workers between 1960 and 1970, and by roughly another 2,400 workers during 1970-1976. The latter increase was due primarily to expansion of employment at Ingalls. As indicated by the bottom line of Table B.P.S.4, the total number of employed residents in the Mobile SMSA was approximately 152,500 persons in 1976, up from 126,660 in 1970.

Table B.P.S.4. Commuting Patterns in the Mobile SMSA

Place of Work	Place of Residence			Total SMSA Jobs
	Mobile Co.	Baldwin Co.	Elsewhere	
1960:				
Mobile Co.	103,747	2,413	1,959	108,119
Baldwin Co.	285	12,673	312	13,270
Jackson Co., MS	606	12		
Escambia Co., FL	72	656		
Elsewhere	1,501	359		
Total Resident Workers	106,211	16,113		
1970:				
Mobile Co.	101,781	4,241	1,772	107,794
Baldwin Co.	483	14,516	297	15,296
Jackson Co., MS	2,315	37		
Escambia Co., FL	471	1,351		
Elsewhere	1,141	324		
Total Resident Workers	106,191	20,469		
1976:				
Mobile Co.	121,000	5,500	2,000	128,500
Baldwin Co.	600	17,000	400	18,000
Jackson Co., MS	4,500	50		
Escambia Co., FL	600	1,750		
Elsewhere	1,200	300		
Total Resident Workers	127,900	24,600		

Sources: Alabama Department of Industrial Relations, Division of Employment Security, 1977.
Environmental Science and Engineering, Inc., 1977.
SARPC, 1977.

POPULATION

The population of the Mobile SMSA has been linked closely to economic trends during the period under discussion. Table B.P.S.5 shows the SMSA population by county in 1960, 1970, and 1975, and indicates the portions of population change in each interval which were due to natural increase (births minus deaths) and net migration. Between 1960 and 1970, natural increase alone would have produced a population gain of over 55,000 persons in the Mobile SMSA. However, due to the standstill in employment produced by the Brookley phase-out, there was a net out-migration from the SMSA of over 42,000 persons. The resulting net population gain of 13,301 persons amounted to an increase of less than 4 percent. This population increment was very unequally distributed among the two SMSA counties. Baldwin County was affected by general suburbanization of the Mobile area population, which was significant although small-scale relative to many other metropolitan regions during the sixties. Baldwin County thus experienced positive net migration, and an overall population gain of over 20 percent. In contrast, the population of Mobile County increased by less than 1 percent.

The migration trend was reversed after 1970. Between 1970 and 1975, the rate of natural increase in the SMSA population averaged only about 1.0 percent per year, down from more than 1.4 percent during 1960 to 1970; but improved economic conditions caused net migration to become positive. The SMSA population increased by about 27,600 persons during the 1970-1975 period, from 376,690 to 403,341. In contrast to the 1960-1970 interval, Mobile County has received more than two-thirds of this recent growth, although Baldwin County has maintained a higher growth rate in percentage terms.

Table B.P.S.6 relates these population changes explicitly to employment trends in the SMSA. Population figures for 1976 have been estimated by assuming that the same annual growth rates prevailed during 1975-1976 as during 1970-1975; the resulting 1976 population estimate for the SMSA is

Table B.P.S.5. Components of Population Change in the Mobile SMSA

	Mobile	Baldwin	Total
Population, 1960	314,301	49,088	363,389
Natural Increase	49,219	6,400	55,619
Net Migration	-46,212	3,894	-42,318
Net Change	3,007	10,294	13,301
Population, 1970	317,308	59,382	376,690
Natural Increase	17,100	2,600	19,700
Net Migration	860	6,091	6,951
Net Change	17,960	8,691	26,651
Population, 1975	335,268	68,073	403,341

Sources: U.S. Bureau of the Census, 1971; 1976.
Mobile Area Chamber of Commerce, 1977.

Table B.P.S.6. Relationships of Population to Employment in the Mobile SMSA

	Mobile County	Baldwin County	Total
1960			
Population	314,301	49,088	363,389
Resident Employment	106,211	16,113	122,324
Employment/Population	0.338	0.328	0.337
1970			
Population	317,308	59,382	376,690
Resident Employment	106,191	20,469	126,660
Employment/Population	0.335	0.345	0.336
1976 Estimates			
Population*	339,000	70,000	409,000
Resident Employment†	127,900	24,600	152,500
Employment/Population	0.377	0.351	0.373

* Estimated by extrapolation of population figures from Table B.P.S.5.

† From Table B.P.S.4.

Sources: U.S. Bureau of the Census, 1961; 1972.
SARPC, 1975.
Environmental Science and Engineering, Inc., 1977.

409,000 persons. Table B.P.S.6 indicates that the ratio of employment to population declined very slightly, from 0.337 to 0.336, between 1960 and 1970. This contrasted significantly with national trends, and could be said to represent a failure of SMSA population to adjust fully to the shortage of employment opportunities in the late 1960's. The employment-to-population ratio rose sharply after 1970, however, reaching a value of 0.373 in 1976. This value (which was roughly equal to the United States employment-to-population ratio in 1970) represents a return to the normal long-term trend in employment participation. The latest labor force data from the Alabama Division of Employment Security indicate that the number of jobs held by SMSA residents is averaging about 3 percent higher in 1977 than in 1976. An increase of this magnitude could be accounted for by a continued expansion of population at its recent 1.4 percent annual rate, along with a continuation of the upward trend in the employment-to-population ratio.

Despite the very rapid employment growth which has occurred since about 1972, there are few, if any, signs of an overall labor shortage in the Mobile SMSA. The number of persons who consider themselves part of the labor force has increased even more than resident employment, so that the number of unemployed workers has actually risen somewhat. The unemployment rate averaged about 5.5 percent during 1970-1974, versus 6.3 percent during 1975-1977. One explanation, which is consistent with earlier discussion, is that the period around 1970 involved substantial underemployment, involving persons who were willing to work but did not enter the labor force due to lack of opportunity. This phenomenon appears to have been particularly important for women and minority groups. In 1970, 36.9 percent of women over 16 years old in the Mobile SMSA were members of the labor force, as compared with 39.5 percent for all other metropolitan areas in Alabama. The corresponding labor force participation rates for the black male population were 63.8 percent versus 66.4 percent. Although there is no firm substantiation as yet, it appears that Mobile's recent economic expansion has reduced underemployment significantly, thereby producing a much-needed improvement in labor force balance.

Another important factor is that tight labor market conditions have not been required in order to induce migration into the Mobile SMSA from elsewhere. The hinterland counties in Alabama and Mississippi traditionally have been characterized by lower wages and fewer economic opportunities in general than the Mobile area (although this situation is clearly changing in certain counties such as Monroe). Thus, there is what could be described as a natural flow of population toward Mobile, which was interrupted only temporarily during the 1960's. Insofar as this trend produces net gains in personal opportunity and economic efficiency, the role of Mobile as a population magnet can be considered socially beneficial--unless the influx exceeds the rate at which the necessary public services and facilities can be provided.

FURTHER EXAMINATION OF RECENT TRENDS

During the years 1973 and 1974, industrial firms announced a total of $615 million in capital investments for the Mobile SMSA, which would amount to roughly three times the investment that took place in the previous five years. Over two-thirds of this investment was announced for sites in the Theodore Industrial Park area. Therefore, observers of the local economy tend to stress the growth impetus provided by expansion of manufacturing activity, and related developments such as oil and gas exploration, the Theodore Barge Canal, the Tennessee-Tombigbee Waterway, and potential petroleum-related developments (all discussed below). It should be noted, however, that the bulk of employment increases between 1970 and 1976 were not related to manufacturing.

Table B.P.S.7 presents an accounting, by major sector, of the employment changes that occurred between 1970 and 1976. The 1,800 increase in manufacturing jobs accounted for only 7 percent of the overall employment increment. Roughly half of these manufacturing jobs could be attributed to new manufacturing plants in the Theodore Industrial Park area, which employed a total of about 1,000 workers as of mid-1977. An important characteristic of these new facilities is that they are very highly capitalized and produce extremely large dollar outputs per worker. Thus, their overall economic impact is very large relative to their direct effect on employment (as will be established in some detail for the proposed Ideal Basic Industries facility). In spite of this fact, it is apparent that manufacturing expansion, together with continued growth in port-related activities, did not account either directly or indirectly for more than half of the 1970-1976 employment increase in the Mobile SMSA. The other responsible factors can be identified as follows.

Out-Commuting--Increased commuting to other areas added 2,400 to the number of employed SMSA residents during the 1970-1976 period. It recently has been announced, however, that the completion of current

Table B.P.S.7. Components of Change in Mobile SMSA Resident Employment, 1970-1976

	Change, 1970-1976	
	Number	Percent
Net out-commuting*	2,400	9.3
Wage and salary employment:		
Durable goods manufacturing	1,200	4.7
Nondurable goods manufacturing	600	2.3
Construction	4,200	16.3
Trade	6,500	25.2
Finance and real estate	1,000	3.9
Services	9,600	37.2
Government	4,600	17.8
Proprietors, domestic workers, agricultural workers, and miscellaneous †	-4,300	-16.7
TOTAL*	25,800	100.0

* From Table B.P.S.4.
† Obtained as a residual.

Source: Alabama Division of Employment Security, 1976.

contracts at Ingalls Shipyard probably will result in substantial layoffs by 1978. If the expected 25 percent reduction in the Ingalls workforce applies proportionally to workers living in the Mobile SMSA, there will be a net loss of between 1,000 and 1,500 resident employees.

Construction--The economic upturn which occurred after 1970 released pent-up demands for new housing, particularly suburban housing, and for other facilities requiring on-site construction. In addition, several industrial development projects, such as the Degussa Alabama and Kerr-McGee chemical plants in Theodore, involved massive construction activity. The resulting addition of 4,200 construction workers between 1970 and 1976 accounted for 16 percent of the overall SMSA employment increase.

Trade and Services--The gain of 17,100 employees in trade, finance, and other services, which comprised fully two-thirds of the increase in resident workers between 1970 and 1976, was far too large to represent merely the multiplier effect of expansion in other sectors. The explanation offered here is that the rapid growth in services-producing activity was in part a catching-up process involving Mobile's central area functions. A nationwide trend during most of the postwar period has been the allocation of an increasing share of economic activity to the production of services, and the progressive concentration of service functions in urban centers where they can be conducted most efficiently and offer the greatest range of choice. The remarkable growth of Atlanta, for example, has been related to this phenomenon. During the 1960's, Mobile largely failed to capitalize upon this potential economic stimulus. The Mobile area's share of all trade, finance, and other service employment in the southeastern states fell from 1.05 percent in 1960 to 0.87 percent in 1970. Even within the immediate economic region centering upon Mobile, the proportions of wholesale, retail, and selected service sales accounted for by the Mobile SMSA all declined between 1963 and 1972 (Community Development Consultants, Inc., 1976). Therefore, the rapid growth in these sectors since 1970 can be interpreted in part as a structural adjustment in which Mobile reasserted itself as a regional center for service functions. This growth impetus can perhaps be expected to taper off somewhat in the future due to geographical and other limitations upon the hinterland which Mobile can effectively serve.

The major determinants of regional growth patterns in the United States prior to 1973 can be identified as the shift toward a service-based economy, the existence of labor cost differentials, the distribution of defense and aerospace expenditures, the decline of agricultural employment, and the attraction of certain "sunbelt" states. The overriding factors in the present era could prove to be resource availability and environmental constraints. As is discussed elsewhere, Mobile is well-situated with regard to energy and other resources, and its position will improve greatly with the opening of the Tennessee-Tombigbee waterway. Ample growth potentials should therefore exist to offset possible reductions in the factors which were important during 1970-1976.

POPULATION AND HOUSING IN SOUTH MOBILE COUNTY

The discussion of potential community impacts of the proposed Ideal Basic Industries manufacturing plant (other than the consideration of gross economic benefits) will focus upon South Mobile County, rather than upon the Mobile SMSA as a whole, since there does not appear to be a serious question as to whether the overall socioeconomic structure of the SMSA can assimilate a project of this scale. It is safe to assume that if any adverse social impacts occur as a result of the proposed project, they will occur in South Mobile County. This area, as defined in the Development Management Plan for South Mobile County Parts I, II, III, and IV (SARPC, 1976), consists of the portion of Mobile County bounded by the southern Mobile corporate limit and a line extending westward along Cottage Hill Road, Highway 33, Johnson Road, Miller Creek, and Big Creek. The area is made up of Census Tracts 65 through 73 (see Figure B.P.S.1).

South Mobile County consists of a roughly square-shaped mainland area, and a separate strip of land--Dauphin Island--to the south. With the exception of Theodore Industrial Park, the vast preponderance of land in South Mobile County is either agricultural, vacant, or occupied by low-density residential development. Dauphin Island is primarily a resort area, with many seasonal cottages but a relatively low year-round population. The overall pattern of development on the mainland can be described fairly simply in terms of the location of transportation routes and waterfront areas.

The three major highway corridors in South Mobile County, in descending order of importance, are: the U.S. Route 90/Interstate 10 corridor, the Dauphin Island Parkway, and Alabama Route 188. These highway corridors form roughly a triangle, with U.S. 90 and Interstate 10 extending together in a northeast-southwest direction, the Dauphin Island Parkway running north-south along Mobile Bay, and Alabama 188 winding northwest-southeast near Mississippi Sound. The U.S. 90/I-10 corridor and the

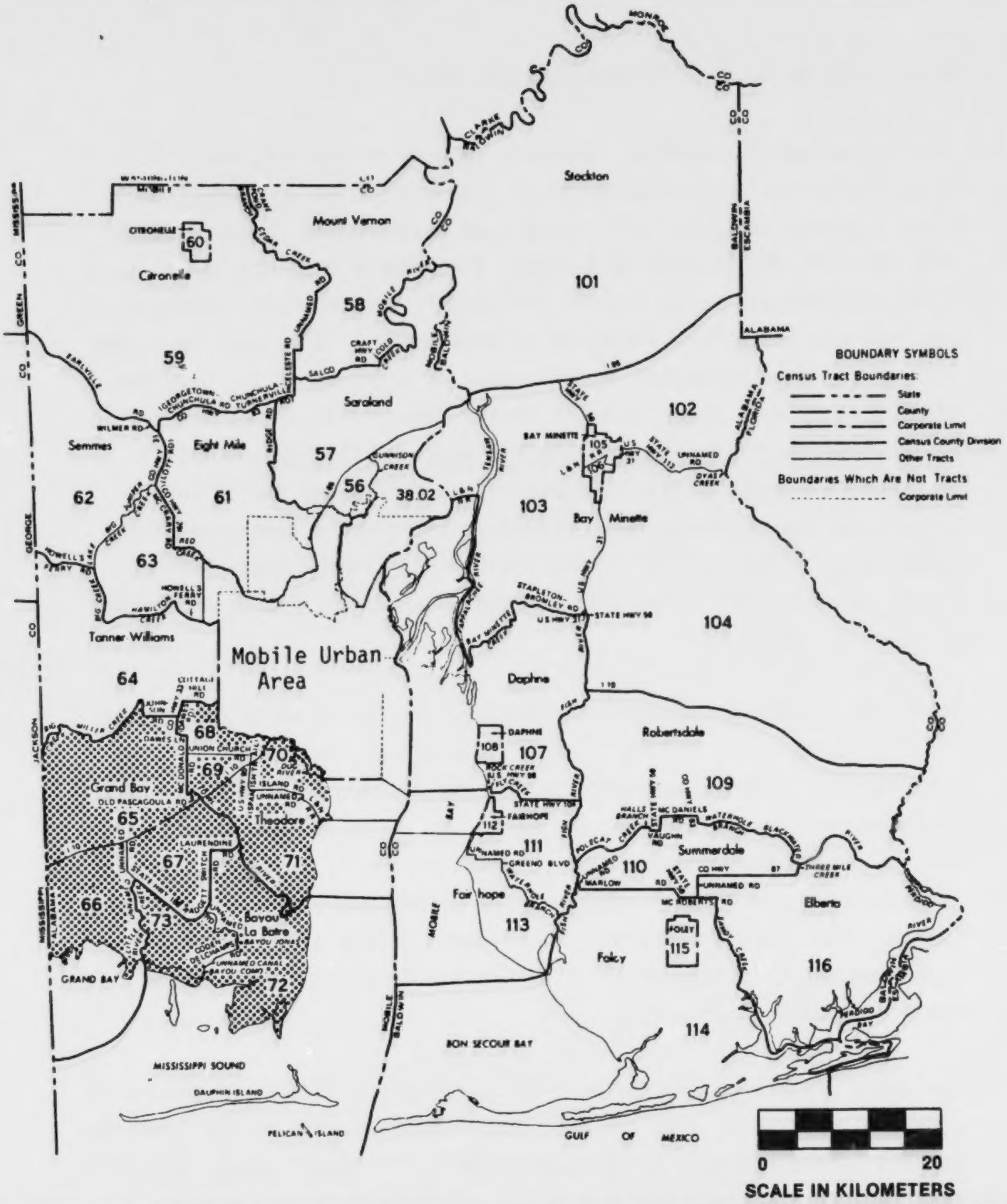

Stockton
Mount Vernon
Citronelle
60
101
58
59
Saraland
102
Semmes
Eight Mile
57
62
61
56
38.02
103
Bay Minette
105
106
63
104
Tanner Williams
Mobile Urban Area
64
Daphne
Robertsdale
68
70
69
108
107
Grand Bay
65
Theodore
109
67
71
112
111
110
Summerdale
66
73
Bayou La Batre
Fairhope
113
Foley
115
Elberta
116
72
114
GRAND BAY
MISSISSIPPI SOUND
DAUPHIN ISLAND
PELICAN ISLAND
BON SECOUR BAY
GULF OF MEXICO
ALABAMA
FLORIDA
MISSISSIPPI
MOBILE
BALDWIN
ESCAMBIA
MONROE
CLARKE
WASHINGTON
GEORGE
GREENE
JACKSON
BOUNDARY SYMBOLS
Census Tract Boundaries:
State
County
Corporate Limit
Census County Division
Other Tracts
Boundaries Which Are Not Tracts
Corporate Limit
0
20
SCALE IN KILOMETERS

Figure B.P.S.1
DEFINITION OF SOUTH MOBILE COUNTY PLANNING AREA

SOURCE: Gulf South Research Institute for U.S. Army Corps of Engineers, 1974.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING PLANT THEODORE INDUSTRIAL PARK MOBILE, ALABAMA

Dauphin Island Parkway link the City of Mobile to Pascagoula, Mississippi, and Dauphin Island, respectively. Alabama 188 is basically a connector between these other highways. All significant population centers in South Mobile County, with the exception of Dixon Corner and an area near the Mobile City limit, are located along the three corridors just mentioned. Proceeding away from Mobile, the communities on Route 90 are Tillman's Corner, Theodore, Irvington, St. Elmo, and Grand Bay. The Dauphin Island Parkway runs through Hollingers Island, Bellefontaine, and Alabama Port. On Alabama Route 188, roughly midway between U.S. 90 and the Dauphin Island Parkway, are Bayou La Batre--the only incorporated city in South Mobile County--and the small communities of Coden and Heron Bay.

Since 1970, residential development in South Mobile County has occurred primarily in two sectors: a band roughly 6.5 kilometers (four miles) wide along the southern boundary of Mobile; and the U.S. 90/I-10 corridor, especially near Theodore and Grand Bay. Much of the population growth in the Grand Bay area has been linked to employment at the Ingalls shipyard in Pascagoula. Residential construction was active at one time in the Dauphin Island Parkway corridor, but has been inhibited since the late 1960's by two factors. First, much of the development along the Dauphin Island Parkway was clearly related to Brookley Air Force Base, which was located on the Parkway a few miles north of the Mobile line. The abrupt slowdown in building activity which accompanied the Brookley phase-out is still evident in the number of areas near the Parkway where streets were laid out but little subsequent development occurred. Second, the opening of Interstate 10 gave the U.S. 90/I-10 corridor much better access to Mobile than possessed by points along the Parkway. Residential growth in Bayou La Batre and other areas on Alabama Route 188 has been limited by the distance of this district from Mobile, and by the failure of the fishing industry--the traditional economic support of these communities--to generate additional jobs.

Table B.P.S.8 presents the 1960 and 1970 populations of the three Census Divisions which comprise the South Mobile County area. The population of the area as a whole increased by roughly 12,000 persons, or more than 50 percent, during this period. The greatest growth in both absolute and percentage terms occurred in the Theodore division, which includes the Tillman's Corner area and all other land between Fowl River and the Mobile corporate limit. The Bayou La Batre division, constituting the entire southeast corner of the planning area, experienced relatively modest growth between 1960 and 1970.

The 1975 population of South Mobile County was estimated in the Development Management Plan as 42,428 persons (Community Development Consultants, Inc., 1976). The later, and presumably more definitive, forecast series generated by SARPC places the 1975 South County population at over 44,500 persons (SARPC, 1977). Both sets of projections have been based on the "Population and Economy" study conducted in 1975, and both assume the same total population for Mobile County. The SARPC estimates have been examined in some detail, since there are some apparent inconsistencies in the apportionment of Mobile county population among component areas. Table B.P.S.9 presents population data for all Census Divisions in Mobile County, grouped for convenience into four categories: urban (Mobile, Prichard, and Chickasaw divisions); suburban north; suburban west; and surburban south. The last coincides with the South Mobile County area presently under discussion. Table B.P.S.9 includes the actual population counts for 1960 and 1970, and three separate estimates of 1975 population, as described below. The 1960 data have not been adjusted to account for the changes in area definitions which occurred due to annexation between 1960 and 1970, but the figures are adequate to convey the trends which took place during this interval.

The SARPC release of March 30,1977, gives 1975 population estimates for census tracts, drainage basins, and incorporated and unincorporated areas of Mobile County, along with projections for future years. The

Table B.P.S.8. Historical Population Trends in South Mobile County

	Population		1960-1970 Change	
	1960	1970	Number	Percent
Theodore Division	10,068	17,473	7,405	73.5
Grand Bay Division	6,174	9,685	3,511	56.9
Bayou La Batre Div.	6,604	7,766	1,162	17.6
TOTAL	22,846	34,924	12,078	52.9

Source: U.S. Bureau of the Census, 1961; 1972.

Table B.P.S.9. Population Estimates for Mobile County by Component Area

	1960	1970	1975 Estimates		
			Computed From SARPC Tract Estimates*	SARPC Series for Incorporated Areas	U.S. Census Bureau
Mobile Division	202,779	190,026	195,927	200,849	196,441
Prichard Division	47,431	41,578	39,676	38,977	39,319
Chickasaw Division	10,130	8,447	7,540	7,983	7,664
(Total, Urban)	(260,340)	(240,051)	(243,143)	(247,809)	(243,424)
Saraland and Eight Mile Division	11,233	18,349	18,786		
Citronelle Division	4,230	4,602	5,325		
Mt. Vernon Division	6,881	6,531	4,538		
(Total, Suburban North)	(22,344)	(29,482)	(28,649)	(25,049)	
Semmes Division	4,498	6,991	9,481		
Tanner-Williams Division	4,273	5,860	8,951		
(Total, Suburban West)	(8,771)	(12,851)	(18,432)	(17,525)	
Bayou La Batre Division	6,604	7,766	8,387		
Grand Bay Division	6,174	9,685	13,049		
Theodore Division	10,068	17,473	23,240		
(Total, Suburban South)	(22,846)	(34,924)	(44,676)	(44,517)†	
(Total Suburban)	(53,961)	(77,257)	(91,757)	(87,091)	(91,844)
TOTAL	314,301	317,308	334,900	334,900	335,268

* Population estimates computed by Environmental Science and Engineering, Inc. on the basis of 1975 SARPC Census Tract estimates. The SARPC estimate for each split tract (i.e., a tract overlapping a 1970 municipal boundary) would be apportioned to the two or more component areas by assuming that the same percentage distribution among areas prevailed as in 1970. One exception was Census Tract 61 (1970 population: 9,140; SARPC estimate for 1975: 8,887), in which the entire population loss indicated by SARPC was assigned to Prichard Division.

† The deviation in estimates for the Suburban South sector may be due to the existence of a very small area of land which was annexed by Mobile prior to 1970 but was not tabulated as part of a split tract in the 1970 Census Tract statistics. For present purposes, this area will be considered as part of South Mobile County.

Sources: U.S. Bureau of the Census, 1961; 1972.
Mobile Area Chamber of Commerce, 1977.
SARPC, 1977.

fourth column of Table B.P.S.9 summarizes the SARPC estimates for incorporated and unincorporated areas. The third column presents a comparable population series for 1975 which has been developed here by aggregating the SARPC estimates for census tracts (with apportionment of population in split tracts on the basis of the known population distribution in 1970).

Comparison of the third and fourth columns of Table B.P.S.9 reveals discrepancies between the estimates for incorporated areas and the estimates based on tract data that are too large to be explained by errors in aggregating the latter. Annexation of land by municipalities between 1970 and 1975 does not appear to be a factor. As indicated by the fifth column of Table B.P.S.9, the tract figures agree somewhat better than the incorporated area series with the U.S. Census estimates for municipalities in 1975 (which are intended to take account of annexation).

The tract-based population estimates imply a reversal of earlier trends in the Suburban North district. This district, consisting of Saraland, Eight Mile, Citronelle, and Mount Vernon divisions, increased in population by more than 60 percent during 1960 to 1970, but the SARPC estimates imply a slight decline from 1970 to 1975. The estimates for individual tracts indicate that the population of Mount Vernon division declined by 30 percent between 1970 and 1975, whereas there was only a 5 percent decline between 1960 and 1970. Also, virtually no population growth has been assigned by the estimates to the outlying regions of Eight Mile and Saraland divisions (consisting of Tracts 56 and 57, and the portions of Tracts 38.02 and 61 located outside Mobile and Prichard). SARPC forecasts that this region, which increased in population by roughly 70 percent during 1960-1970, will gain population rapidly after 1975.

These apparent inconsistencies primarily involve the populations of the west and north suburban districts, rather than South Mobile County. Therefore, the SARPC estimates for tracts in South Mobile County are retained as the basis for the forecasts utilized here. Table B.P.S.10 presents these 1975 populations for individual tracts, and provides additional estimates for 1977. The latter have been obtained by assuming that SARPC has forecast correctly the population increment for South Mobile County as a whole between 1975 and 1980 (in the incorporated-area tabulation), and by allocating 40 percent of this increment to individual tracts according to their shares of the 1970-1975 population gain. This procedure is somewhat conservative, in light of recent events, and thus compensates for the fact that the 1975 South County total may be an overestimate.

The total population of the South Mobile County planning area as of mid-1977 is estimated at roughly 47,400 persons. This implies a compound growth rate of 4.5 percent per year since 1970, slightly above the average rate of 4.3 percent per year which prevailed during 1960 to 1970. Population growth in the Grand Bay division, which includes the U.S. 90/I-10 corridor southwest of the Fowl River, has accounted for slightly more than one-third of the total population increase since 1970, as opposed to less than 30 percent during 1960 to 1970. The fastest-growing areas in percentage terms have been Tracts 69 and 67, which include the land lying north and south of the Fowl River/Interstate 10 crossing, respectively.

Observers tend to associate the recent population increases in South Mobile County, and particularly in the Tillman's Corner area, with the concurrent expansion of manufacturing employment at Theodore Industrial Park. However, while the regional economic impacts of the Industrial Park have been great, it is important not to exaggerate the responsibility of the industrial area for population increases in South Mobile County up to the present. Table B.P.S.11 provides some perspective on this question by indicating the place-of-work in 1970 and 1977 of employed persons living in the Tillman's Corner area and South Mobile County as a whole. The 1977 figures are estimates based on the best available information. It is assumed that, of the approximately 1,000 industrial workers in the Theodore Park area in mid-1977, one-third

Table B.P.S.10. Current Population Estimates for South Mobile County, by Component Area

	1970	1975, SARPC	1977, Estimated	Percent Change 1970-1977
Bayou La Batre Division				
Tract 72	2,945	3,100	3,144	6.8
Tract 73	4,821	5,287	5,418	12.4
(Subtotal)	(7,766)	(8,387)	(8,562)	(10.2)
Grand Bay Division				
Tract 65	3,384	4,625	4,975	47.0
Tract 66	2,928	3,519	3,686	25.9
Tract 67	3,373	4,905	5,337	58.2
(Subtotal)	(9,685)	(13,049)	(13,998)	(44.5)
Theodore Division				
Tract 68	3,542	4,847	5,215	47.2
Tract 69	4,035	5,844	6,354	57.5
Tract 70	3,697	4,624	4,886	32.2
Tract 71	6,199	7,925	8,412	35.7
(Subtotal)	(17,473)	(23,240)	(24,867)	(42.3)
TOTAL	34,924	44,676	47,427	35.8

Sources: U.S. Bureau of the Census, 1972.
SARPC, 1977.
Environmental Science and Engineering, Inc., 1977.

Table B.P.S.11. Sources of Employment for South Mobile County Residents

	Tillman's Corner Area (Tracts 68 and 69)		Total, South Mobile County	
	1970	1977	1970	1977
Total Population	7,577	11,569	34,924	47,427
Employment/Population Ratio	0.340	0.375	0.328	0.365
Resident Employees	2,576	4,340	11,456	17,310
Place of Work:				
City of Mobile	1,658	2,500	5,033	6,900
Theodore Industrial Park	0	330	0	660
Rest of Mobile County	591	900	4,424	6,100
Jackson County, Mississippi	317	600	1,949	3,600
Elsewhere	10	10	50	50

Sources: U.S. Bureau of the Census, 1972.
Environmental Science and Engineering, Inc., 1977.

lived in the vicinity of Tillman's Corner and two-thirds lived in South Mobile County as a whole. These estimates probably are high, given the present residential distribution of industrial workers in the Mobile SMSA. The number of commuters to Pascagoula (Jackson County), Mississippi, is estimated by assuming the same areal distribution of commuters from the SMSA to Pascagoula as existed in 1970. Finally, the numbers of workers employed in Mobile and in the remainder of Mobile County have been allocated using the same proportions in 1977 as in 1970.

Table B.P.S.11 indicates that industrial employment at Theodore has been a significant but by no means dominant influence on residential growth in South Mobile County. The Industrial Park has accounted for 11 percent or less of the new workers living in South Mobile County, ranking well behind employment in Mobile (32 percent); employment in the remainder of Mobile County (29 percent); and commutation to Pascagoula (28 percent). For the Tillman's Corner area alone, it is estimated that less than 20 percent of new employees work in Theodore Industrial Park. This area is oriented heavily toward employment in Mobile, which accounted for roughly half the increase in resident workers between 1970 and 1977. The point here is by no means to minimize the importance of the Industrial Park, but only to establish that rapid population growth in South Mobile County would have occurred with or without new industrial development. This will remain true to a substantial extent in the near future, although the relative influence of the Industrial Park can be expected to increase. It should be noted that Table B.P.S.11 does not deal explicitly with the very large numbers of construction workers that are intermittently required for industrial development projects at Theodore, since these workers are believed to be part of the general labor pool in the metropolitan region rather than concentrated in South Mobile County.

Tables B.P.S.12 and B.P.S.13 present estimates of recent household and dwelling unit trends in South Mobile County census tracts. Population in households as of 1977 is obtained from Table B.P.S.10 by assuming

Table B.P.S.12. Household Estimates for Census Tracts in South Mobile County

	Population In Households		Population Per Household		Number of Households	
	1970	1977	1970	1977	1970	1977
Bayou La Batre Division						
Tract 72	2,814	3,013	3.428	3.18	821	947
Tract 73	4,813	5,410	3.555	3.29	1,354	1,644
(Subtotal)	(7,627)	(8,423)	(3.507)	(3.25)	(2,175)	(2,591)
Grand Bay Division						
Tract 65	3,384	4,975	3.760	3.48	900	1,430
Tract 66	2,888	3,646	3.693	3.42	782	1,066
Tract 67	3,373	5,337	4.001	3.71	843	1,439
(Subtotal)	(9,645)	(13,958)	(3.820)	(3.55)	(2,525)	(3,935)
Theodore Division						
Tract 68	3,540	5,213	3.684	3.41	961	1,529
Tract 69	4,033	6,352	3.752	3.48	1,075	1,825
Tract 70	3,697	4,886	3.465	3.21	1,067	1,522
Tract 71	6,198	8,411	3.740	3.47	1,657	2,424
(Subtotal)	(17,468)	(24,862)	(3.670)	(3.41)	(4,760)	(7,300)
TOTAL	34,740	47,243	3.672	3.42	9,460	13,826

Sources: U.S. Bureau of the Census, 1972.
Environmental Science and Engineering, Inc., 1977.

Table B.P.S.13. Dwelling Unit Estimates for Census Tracts in South Mobile County

	Number of Year-Round Dwelling Units		Net Increase in Dwellings 1970-77	Pre-1970 Dwellings Lost 1970-77	New Units Constructed 1970-77	Units Built Per Year 1970-77
	1970	1977				
Bayou La Batre Division						
Tract 72	942	1,068	126	44	170	24
Tract 73	1,430	1,720	290	66	356	51
(Subtotal)	(2,372)	(2,788)	(416)	(110)	(526)	(75)
Grand Bay Division						
Tract 65	938	1,468	530	43	573	82
Tract 66	857	1,141	284	40	324	46
Tract 67	899	1,495	596	42	638	91
(Subtotal)	(2,694)	(4,104)	(1,410)	(125)	(1,535)	(219)
Theodore Division						
Tract 68	1,013	1,581	568	47	615	88
Tract 69	1,104	1,854	750	51	801	114
Tract 70	1,149	1,604	455	53	508	73
Tract 71	1,780	2,547	767	83	850	121
(Subtotal)	(5,046)	(7,586)	(2,540)	(234)	(2,774)	(396)
TOTAL	10,112	14,478	4,366	469	4,835	690

Sources: U.S. Bureau of the Census, 1972.
Environmental Science and Engineering, Inc., 1977.

that the number of persons in group quarters is unchanged from 1970 (at which time, it was 184 in South Mobile County as a whole). The number of persons per household in each tract is assumed to decline at the same percentage rate as forecasted by SARPC for all of Mobile County. The resulting estimates of number of households, shown in the last two columns of Table B.P.S.12, indicate that households have been increasing faster than population by a considerable margin.

In Table B.P.S.13, the total number of year-round dwelling units in each tract is estimated by assuming that the number of vacant units is unchanged from 1970, and adding this to the number of households (which equals occupied units). This assumption implies declining vacancy rates, with the magnitude of decline linked to the rate of population growth. Loss of dwelling units from the housing stock due to demolition and abandonment is assumed to take place at a low rate during 1970-1977, as during 1960-1970, because of the relatively small numbers of old units present. When the estimated loss of pre-1970 dwellings is added to the net increase in units during 1970 to 1977, an estimate is obtained of the volume of new residential construction since 1970, which is shown for each tract in the fifth column of Table B.P.S.13. The last column of Table B.P.S.13 presents estimates of dwelling unit construction per year between 1970 and 1977, including installation of mobile homes. The rates of construction are impressive, with the Theodore Division alone accounting for nearly 400 units per year.

On the whole, the stress placed by new industrial development on the supply of housing is not considered here to be a major problem, for two reasons. First, the portion of South Mobile County near Mobile and the Theodore industrial area is part of a large metropolitan housing market which can supply new units at almost any rate demanded. It is important that, despite the recent escalation in land values, housing in South Mobile County has not been priced out of range for most workers in modern manufacturing plants. Second, a very large housing stock exists in nearby Mobile for any workers who are unable to find a suitable place to live in South Mobile County. Therefore, the discussion in later sections will focus primarily upon ancillary aspects of residential development, such as land use patterns and demand for public facilities, rather than upon the availability of housing as a concern in itself. An additional point is that the present tight housing market conditions in South Mobile County should ease next year with the anticipated layoffs at Ingalls shipyard, and should remain somewhat less tight in the future due to the expected slowing of population growth (see Forecast Section).

Tables B.P.S.14 and B.P.S.15 provide additional insight into the community characteristics of South Mobile County. This information is from the 1970 Census and is therefore somewhat dated, but still provides a reasonably accurate description of the area. The upper portion of Table B.P.S.14 compares the census tracts in South Mobile County with the Mobile SMSA in terms of the distribution of resident workers among occupational categories. The occupations have been arranged informally into three groups, which represent high, medium, and low income levels, respectively (although many individual cases deviate widely). A fact which emerges from this tabulation is that only Census Tract 70 fits the stereotyped description of an affluent, upper-middle-class, white collar suburb. This tract, which extends along the Mobile city limit from Mobile Bay to Interstate 10, contains many luxurious homes fronting upon the Bay, Dog River, and tributary waterways. Tract 70 contains significantly higher percentages of workers in professional, management, and sales occupations than the Mobile SMSA. A large percentage of Tract 70 workers hold high-level industrial production jobs, but there are relatively few "operatives" of machinery, and almost no laborers or custodial workers. These characteristics are shared to a somewhat lesser extent by Tract 69.

The remainder of Theodore and Grand Bay divisions, however, are solidly middle-class. Resident employment is concentrated in industrial jobs, and to a lesser extent in clerical and retail sales positions and farming. There generally is an under-representation of the extremes, in terms of earnings and status, with the exception of the low-paid workers living in Tracts 67 and 71. The occupational structure of the resident

Table B.P.S.14. Population Characteristics of Census Tracts in South Mobile County, 1970

	Mobile SMSA	Theodore Division				Grand Bay Division			Bayou La Batre Division	
		68	69	70	71	65	66	67	72	73
OCCUPATIONAL DISTRIBUTION OF RESIDENT WORKERS										
Professional, Technical	9.1%	8.1%	11.3%	12.3%	7.3%	6.1%	8.3%	4.8%	4.7%	2.6%
Managers and Administrators	8.1	9.1	8.8	10.4	5.4	5.2	8.1	8.5	6.0	6.5
Sales Workers, Ex. Retail	3.5	2.8	5.6	6.1	1.3	1.3	1.0	0.0	6.5	1.6
Craftsmen, Foremen	16.1	19.6	21.8	24.3	18.7	24.6	24.6	25.7	16.7	15.0
Teachers (Public)	3.3	0.8	3.0	3.4	3.2	0.9	6.7	0.5	2.1	2.1
Clerical and Retail Sales	19.6	23.6	23.2	23.4	17.0	8.0	9.8	10.4	15.1	12.3
Farm and Service Workers	7.3	7.3	3.4	7.9	11.0	18.6	8.9	5.8	2.3	4.9
Operatives	16.9	17.7	16.6	9.8	20.1	24.5	21.9	25.5	22.5	26.7
Laborers	6.9	7.2	4.6	1.7	8.2	5.8	5.9	10.1	14.3	23.2
Cleaning/Food Services, and Private Household Workers	9.2	3.8	1.7	0.7	7.8	5.0	4.8	8.7	9.8	5.1
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
FAMILY INCOME										
Median (in 1969)	$7,733	$8,785	$9,016	$9,482	$7,338	$7,649	$8,763	$6,572	$6,080	$6,177
Percent in Poverty	18.6%	4.7%	9.2%	11.2%	18.1%	14.7%	11.5%	32.6%	24.0%	22.0%
BLACK POPULATION (%)	30.0%	0.2%	0.3%	4.6%	29.5%	20.3%	14.6%	36.3%	7.6%	8.1%
PERSONS OVER 5 YEARS LIVING IN SAME HOUSE AS IN 1965										
White Population (%)		45.5%	45.1%	55.5%	57.8%	57.3%	42.2%	53.2%	52.6%	57.7%
Black Population (%)		--	--	--	69.7%	62.5%	41.4%	60.5%	--	--

Source: U.S. Bureau of the Census, 1972.

Table B.P.S.15. Housing Characteristics of Census Tracts in South Mobile County, 1970

	Theodore Division				Grand Bay Division			Bayou La Batre Division	
	68	69	70	71	65	66	67	72	73
All Housing Units	1,014	1,105	1,180	1,830	938	857	899	1,419	1,445
Seasonal Units	1	1	31	50	0	0	0	477	15
Year-Round Units	1,013	1,104	1,149	1,780	938	857	899	942	1,430
Single-Family Homes and Mobile Homes	1,002	1,086	1,130	1,751	926	826	893	884	1,430
Multi-Unit Dwellings	11	18	19	29	12	31	6	58	0
Percent of Units Built 1960-1970	56.3%	53.7%	45.2%	36.9%	43.7%	58.8%	32.9%	42.6%	25.3
Vacancy Rates:									
Available Units	3.4%	1.2%	3.3%	3.3%	1.1%	4.5%	1.4%	7.7%	1.9
Other Units	2.0%	1.5%	4.4%	4.1%	3.1%	5.1%	5.2%	7.1%	3.7
Occupied Units	961	1,075	1,067	1,657	900	782	843	821	1,354
Owner-Occupied Units	819	936	895	1,326	750	658	718	626	1,066
Percent Owner-Occupied	85.2%	87.1%	83.9%	80.0%	83.3%	84.1%	85.2%	76.2%	78.7%
Median Value of Owner-Occupied Units	$11,900	$12,900	$17,000	$10,400	$10,200	$13,700	$7,800	$9,000	$7,200
Renter-Occupied Units	142	139	172	331	150	124	125	195	288
Median Gross Rent	$112	$98	$94	$86	$71	$75	$59	$76	$80
Percent of Renters Paying 25% of Income or More	23.3%	12.7%	19.7%	23.3%	16.7%	40.6%	30.0%	36.1%	37.1%
Percent of Units With:									
Public Water	77.9%	58.4%	37.6%	47.6%	1.3%	62.1%	7.2%	25.2%	78.2%
Public Sewer	11.6%	8.1%	3.5%	0.7%	1.6%	6.3%	0.0%	10.1%	1.5
All Plumbing Facilities	97.4%	96.7%	96.1%	85.9%	85.4%	90.5%	74.5%	85.4%	85.6%

Source: U.S. Bureau of the Census, 1972.

labor force in Bayou La Batre division is somewhat different, due to the influence of commercial fishing activity and Dauphin Island. Crewmen of the fishing vessels are classed as laborers, thus accounting for the large percentages in that category in Tracts 72 and 73; and the resort trade on Dauphin Island explains the substantial employment in sales and food services in Tract 72. Perhaps the most important point to be gained from this tabulation is that although residential growth in the South County area has not been due primarily to the expansion of industry at Theodore (as discussed earlier), this growth has been consistent with industry in terms of the occupations represented, which would not be the case if South Mobile County were emerging as a series of white-collar suburbs.

The lower portion of Table B.P.S.14 deals with family income, race, and residential mobility. Median family income is highest in the suburban areas near Mobile and in the Grand Bay area, where it exceeds substantially the median for the Mobile SMSA, and lowest in the southern and eastern portions of the county. The percent of families in poverty is roughly equal to or exceeds the SMSA figure in Tracts 67, 71, 72, and 73. Blacks comprise 20 percent or more of the population in Tracts 65, 67, and 71, reflecting the existence of several traditionally black communities located in the central portion of the county. The relative stability of these communities is indicated by the fact that higher proportions of the 1970 black population had lived in the same house for five years or more than was true for the white population.

The housing data presented in Table B.P.S.15 also reflect significantly upon the structure of the South Mobile County community. In 1970, virtually all dwelling units in all census tracts consisted of single-family structures and mobile homes, rather than units in multi-family structures (fourth and fifth lines of Table B.P.S.15). Home ownership was remarkably high, exceeding 75 percent in all tracts and 85 percent in three cases. This pattern was as strong for blacks as for whites: home ownership for black households exceeded 75 percent in all significant cases, and was 80 percent or higher in all but one of these. The high rate of home ownership for blacks is indicative of the community stability mentioned earlier. With regard to the median value of owner-occupied dwellings, Tract 70--containing the upper-income communities along Dog River--was considerably higher than any other tract; whereas Tracts 67 and 73, representing the south central portion of the region, were low. The fourth line from the bottom of Table B.P.S.15 presents a quantity which is often considered a good indicator of housing shortage, namely the percentage of renter households for whom gross rent constituted more than one-fourth of total income. The 1970 value of this index for the Mobile SMSA was 35.7 percent. The only values in South Mobile County that were high relative to the SMSA were for Bayou La Batre division and Tract 66; most others were very much lower than the SMSA value. The conclusion would be that shortages of moderately-priced housing did not exist in most of South Mobile County in 1970. The next two lines of Table B.P.S.15 show the incomplete coverage of public water and sewer facilities in 1970, particularly sewer. Finally, the last line indicates that about half the tracts in South Mobile County had significant numbers of dwelling units which lacked complete plumbing facilities, the most outstanding case being Tract 67 in the south central area.

LAND USE AND LAND VALUE

Quantitative measurements of land use characteristics in South Mobile County in 1968 and 1975 are available from SARPC planning programs. In addition, a detailed land use map of the area immediately surrounding the proposed Ideal Basic Industries facility has been prepared as part of the current study; this is discussed in a later section. The quantitative descriptions for 1968 and 1975 are presented in Table B.P.S.16. Since neither of these data sets pertained to the exact area under consideration here, various adjustments have been required, but the level of accuracy is sufficient for purposes of discussion.

About 14 percent of all land in South Mobile County consists of wetland, or marsh, to which can be added substantial areas in which seasonal wetness or flooding constitutes a barrier to most forms of development, including agriculture. These areas are relatively concentrated in the southern portion of the county and along streams and waterways. Roughly another third of South Mobile County land was used in 1968 for resource production, primarily farming. The amount of residential land in the area was measured at nearly 7,700 hectares (19,000 acres) in 1968. However, when large residential landholdings are deflated in order to reflect the area of land actually occupied, the residential acreage is reduced by more than half. The 1975 SARPC estimate of 2,946 hectares (7,280 acres) amounts to only 4 percent of all land in the South Mobile County area.

It is clear from the table that the amount of land devoted to retail and wholesale trade increased greatly between 1968 and 1975, although the 300 percent growth indicated in the table may be an exaggeration. [The 1975 "Development Management Plan" report estimated only 69 hectares (170 acres) of commercial land in South Mobile County.] Commercial development in South Mobile County continues to be made up largely of convenience establishments such as grocery stores, drug stores, and eating places that cater to local communities. The breadth of facilities is steadily expanding, however, as evidenced by the recent opening

Table B.P.S.16. Approximate Hectares (Acreages) of Land in Various Uses, South Mobile County, 1968 and 1975.

	1968		1975	
	Hectares	(Acres)	Hectares	(Acres)
Wetland	10,608	(25,872)	--	--
Resource production land	26,953	(65,740)	--	--
Roads	1,503	(3,667)	--	--
Railroads	102	(249)	--	--
Residential land:				
Single-family dwellings	*	*	2,972	(7,248)
Multi-family dwellings	*	*	13	(32)
Total	*	*	2,985	(7,280)
Trade:				
Retail trade	--	--	292	(712)
Wholesale trade	--	--	45	(110)
Total	85	(207)	362	(882)
Services	--	*	9	(22)
Industrial land	21	(50)	461	(1,124)
Recreational land	354	(864)	--	--
TOTAL (APPROXIMATE)	76,260	(186,000)	76,260	(186,000)

* 1968 measurements of residential land and service land are not comparable with 1975 measurements.

Source: SARPC, 1968; 1977.

of branch banks at Tillman's Corner. Other significant components of commercial activity in South Mobile County are the following: (1) retail establishments along Route 90 which sell high-bulk items such as furniture, generally at discount; (2) facilities at the Dog Race Track located southwest of Theodore; (3) a number of small marinas situated on inlets off Mobile Bay; and (4) commercial facilities associated with the resort trade on Dauphin Island.

The vast increase in industrial land shown on the next-to-last line of Table B.P.S.16 has been due almost entirely to the Theodore Industrial Park development. It should be noted that although the SARPC estimate of 461 hectares (1,124 acres) of industrial land does not include all holdings by current Industrial Park occupants, this figure still overestimates somewhat the amount of land actually developed for industrial use in 1975. Finally, the recreational land in South Mobile County consists in large degree of private facilities, and is not evenly distributed throughout the area. Over half of the 354 hectares (864 acres) cited in the bottom line of the table are located on Dauphin Island.

Land values have been increasing rapidly throughout most of South Mobile County, particularly along the U.S. 90/Interstate 10 corridor. Realtors report increases of as much as 1000 percent, relative to the mid-1960s, in the sale price of raw land suitable for residential development. Speculators have become active in the land market; and substantial areas in South Mobile County are now being held primarily for their investment value. It is relevant, however, that these changes have taken place in a context of initially very low land values, relative to other suburban and exurban communities in the U.S. Thus, despite the rapid increases that have occurred, land values still have not attained levels at which development patterns might be distorted; i.e., at which it would be infeasible to construct facilities similar to existing land uses. With regard to industrial land, it remains possible to purchase large parcels for $10,000 per acre or less, which is high relative to the recent past but not relative to other U.S. metropolitan areas with equivalent locational advantages.

The population growth and accompanying rise in land values in South Mobile County can be related to documented evidence regarding the locational preferences of Mobile area residents. A household survey conducted by SARPC in 1971 asked 448 respondents whether or not they planned to move in the foreseeable future or would like to move, and their preferred area of residence if they moved. Mobile, Baldwin, and Escambia counties were partitioned into 15 zones, and the residential preferences of respondents were coded and tabulated on this basis. It was found that for only two zones did the proportion of respondents preferring the zone greatly exceed the share of area residents currently living in the zone. These were South Mobile County (including Tanner Williams Division to the west of Mobile), which was preferred by 17.4 percent of respondents, and a section of Mobile near Dog River that was chosen by 13.4 percent. Only 9.2 percent and 3.1 percent, respectively, of respondents were currently living in these areas. Although survey results of this type are by no means an adequate basis for population forecasts, because respondents are often unrealistic, the findings indicate that the escalation of land values in South Mobile County is founded upon broadly-held preferences, rather than being simply the result of speculation.

The present study gives special attention to land values in the central portion of the Dauphin Island Parkway corridor, namely the area bounded by Island Road (also known as Hamilton Road), Fowl River, and Rangeline Road (extended). This strip of land contains a number of small, scattered residential communities, which are separated from the residential areas to the west by a band of virtually unpopulated land between Rangeline and Bellingrath roads. The central Parkway corridor contains nearly all of the residences that might be impacted environmentally by industrial development in the eastern portion of the Theodore Industrial area. Also, this is perhaps the only district of

South Mobile County at present that is specifically dependent upon industrial development at Theodore for support of housing demand.

As indicated earlier, the housing market in the Dauphin Island Parkway corridor has been adversely affected over the past decade by the phase-out of Brookley Field. However, land values are now being affected by the positive stimulus of nearby industrial jobs. For example, an attractive development near the South Fork Deer River, which will contain about 50 homes, currently is being marketed by Ladner and Company at price levels which are appropriate for well-paid industrial workers. Reportedly, about half of all sales have been to employees of firms in the Theodore Industrial Park. Other plans discussed by realtors suggest that the market can now begin to absorb the tracts of residential land that were gridded in the 1960's but never developed.

The conclusion is that existing residents of the Parkway corridor who occupy middle-income housing probably can sell their homes at a profit, if they so desire, within a reasonable time interval. In the event that future industrial development did have negative impacts on neighborhood amenity, there would be an important distinction between these residents and persons who could not sell at a profit, or were unable to secure equivalent housing elsewhere. The latter conditions might hold for owners of high-value homes, especially waterfront properties. The breakpoint in terms of property value would be perhaps $40,000 in current dollars. Translating this as $25,000 in 1970 dollars, the census indicates that only 10 to 15 percent of all dwelling units in the central Parkway corridor would fall in this category (as opposed to well over 20 percent in the Dog River area farther north). Therefore, the central Parkway corridor as a whole is not considered highly vulnerable to negative land value effects resulting from industrial development, notwithstanding the positive influence of such development on the value of land for non-residential purposes.

TRANSPORTATION

In South Mobile County, travel is synonymous with auto transportation since there is no mass transit of any kind available in the planning area. Some of the more pressing community needs in South Mobile County involve transportation facilities, because existing roads and highways have been subjected to rapidly increasing traffic flows. The extent of these increases is dramatized in Table B.P.S.17, which gives average daily traffic counts for the three major state-maintained highways in 1970 and 1976. The increases are striking, in terms of both absolutes and percentages, for Interstate 10 throughout its length and for U.S. 90 north of Island Road (Hamilton Road). At all three points monitored on Interstate 10, the increases during the six-year period amounted to 70 percent or more.

A general description of highway conditions and possible corrective actions is contained in the Development Management Plan for South Mobile County. Two of the traffic problem areas discussed in this study are the five-point intersection at Tillman's Corner (involving Three Notches Road, Old Pascagoula Road, and U.S. Route 90), and the section of Theodore Road between U.S. Route 90 and Interstate 10, for which widening and realignment are recommended in order to form a cross-county arterial with Island Road (Hamilton Road). The present discussion will focus upon conditions east of U.S. 90 in the Industrial Park area, involving: Rangeline Road, Island Road, Laurendine Road, the Dauphin Island Parkway, and various proposed routes which would supplement these roads in the future. A Transportation Plan was developed for the Mobile area by SARPC in the late 1960's, but the plan no longer describes accurately the highway improvements that realistically can be expected to occur. The following paragraphs describe the conditions which presently exist and the probable scheduling of future improvements as ascertained by interviews with personnel at the Alabama Department of Highways, SARPC, and the Mobile County Highway Department.

Table B.P.S.17. Average Daily Traffic Counts for Points on Major Highways in South Mobile County, 1970 and 1976

	1970	1976	1970-1976 Change	
			Number	Percent
U.S. Highway 90*				
West of Ala. Route 19	2,490	3,720	1,230	49.4
East of Ala. Route 19	3,550	--	--	--
South of Island Road	4,860	7,350	2,490	51.2
North of Island Road	10,700	16,920	6,220	58.1
South of Interstate 10	11,850	20,840	8,990	75.9
North of Interstate 10	11,600	20,670	9,070	78.2
Mobile City Limit	12,890	21,000	8,110	62.9
Interstate Route 10				
Near Irvington	8,440	14,320	5,880	69.7
West of U.S. 90	9,380	17,240	7,860	83.8
Mobile City Limit	14,490	25,520	11,030	76.1
Dauphin Island Parkway				
At Laurendine Road	2,460	2,840	380	15.4
At Island Road**	3,010	4,340	1,330	44.2
Mobile City Limit	5,210	6,930	1,720	33.0

* The locations shown are progressively closer to Mobile; and similarly for the ordering of locations on Interstate 10 and the Dauphin Island Parkway.

** Island Road is also known as Hamilton Road.

Source: Alabama Department of Highways, 1977.

Dauphin Island Parkway

The Parkway, also known as Alabama Route 163, extends from Government Street in central Mobile all the way to Dauphin Island. The Dauphin Island Parkway is presently four-lane north of Perch Creek, and two-lane from Perch Creek to Dauphin Island. The condition of the roadway through South Mobile County is generally good. The Alabama Department of Highways has recently announced plans to extend the four-lane section from Perch Creek to Island Road (Hamilton Road).

Rangeline Road

Other than Baker Sorrell Road (the detour to the Dauphin Island Parkway), Rangeline Road is the only public right-of-way providing access to the interior of Theodore Industrial Park. Rangeline Road began as a two-lane highway running north and south from Island Road (Hamilton Road) to Baker Sorrell Road. (A light-duty street which follows the same course north of Island Road is also known as Rangeline Road.) Recently, a new bridge was constructed over the Deer River to replace the old Rangeline Road bridge, which would not have allowed westward extension of the barge canal. An additional two-lane roadway which parallels the older roadway from just north of the Deer River to Baker Sorrell Road has also been constructed. The new roadway then continues south to provide access to Laurendine Road. Rangeline Road will be upgraded in the near future to a four-lane facility from Island Road to the Deer River bridge, and the Island Road intersection will be improved. Long-term plans call for an extension of Rangeline Road south of Laurendine to join the Dauphin Island Parkway near Fowl River.

Island Road (Hamilton Blvd.)

Island Road extends from U.S. 90 near Theodore to the Dauphin Island Parkway at Hollingers Island after which it continues eastward for a short distance as a local street. This two-lane road carries a substantial traffic load, which includes the Parkway detour traffic east of Rangeline and virtually all vehicles traveling to and from the Industrial Park area. The three major problem areas on Island Road are the intersections with Rangeline Road and the Dauphin Island Parkway, and the grade crossing with the Louisville and Nashville Railroad near Theodore. Neither of the intersections is signalized at present. Peak-hour congestion is particularly notable at the Rangeline Road intersection, where ten minutes are often required to travel the 732 meter (800 yard) distance on Rangeline from the railroad crossing to the intersection. A one-day count of vehicles approaching this intersection from the four directions was conducted in the summer of 1977 by the Mobile County Highway Department in order to study the signalization question. The 24-hour one-way totals were: east (Island Road), 7,338; west (Island Road), 6,676; south (Rangeline Road), 7,653; and north (Rangeline Road), 595.

An overall traffic pattern for the Rangeline Road/Island Road intersection can be inferred from these data by assuming that: (1) the small flow of vehicles from north Rangeline Road consists of equal numbers heading east, south, and west through the intersection; and (2) each flow through the intersection is equal to the flow in the opposite direction (e.g., right turns onto Rangeline south are the same as left turns onto Island west). The overall traffic pattern yielded by these assumptions is shown in Table B.P.S.18. An interesting aspect of the tabulation is the number of vehicles continuing straight on Island Road without using Rangeline, which amounts to a two-way count of approximately 6,000. This would indicate the extent to which Island Road is important as a connector between U.S. 90 and the Brookley/Dog River area, in addition to its roles as an access road to the Industrial Park and as part of the Dauphin Island Parkway detour. A second interesting feature is that the eastern segment of Island Road apparently carries more of the Rangeline Road traffic than the western segment. Since the volume of through traffic using Rangeline Road as a detour does not appear sufficient to account for this, the conclusion would be that a

Table B.P.S.18. Traffic Flow through the Intersection of Island* and Rangeline Roads, 1977

Direction Approaching Intersection	Direction Leaving Intersection			
	East (Island Road)	West (Island Road)	South (Rangeline Road)	North (Rangeline Road)
East (Island Road)	3,081	--	4,058	199
West (Island Road)	--	3,081	3,397	198
North (Rangeline Road)	4,058	3,397	--	198
South (Rangeline Road)	199	198	198	--
Total, One-Way	7,338	6,676	7,653	595
Total, Two-Way	14,676	13,352	15,306	1,190

* Island Road is also known as Hamilton Road.

Source: Environmental Science and Engineering, Inc., (1977) based on one-day traffic count by Mobile County Highway Department, 1977.

significant proportion of trips to and from the Industrial Park utilize the Dauphin Island Parkway corridor rather than the U.S. 90/ Interstate 10 corridor.

With regard to the grade crossing of Island Road and the Louisville and Nashville Railroad near Theodore, the following comments were offered in the Development Management Plan for South Mobile County, p. 40:

> At present, conflicts between rail and highway traffic within the Planning Area are not critical, but more acute problems can be anticipated....Island Road will experience greatest conflicts as a result of increasing automotive traffic generated by the Theodore Industrial Park and the movement of rail traffic from the Park along the State Docks Terminal Spur onto the mainline of the L and N Railroad (SARPC, 1976).

Widening and other improvements to Island Road (Hamilton Road) have been assigned a high priority by public agencies and will be undertaken in the near future. These improvements, to be completed in 1979 or 1980, will include the addition of a third lane to Island Road from the Dauphin Island Parkway to U.S. Route 90 and upgrading of the intersection with Rangeline Road. These steps should greatly alleviate, if not eliminate, the present traffic congestion and hazards on Island Road.

Rangeline Expressway

When completed, the Rangeline Expressway will extend northwest from the Island Road (Hamilton Road) intersection to link Rangeline Road with Interstate 10 and U.S. Route 90. The portion between U.S. 90 and I-10 already is under construction, along with the I-10 interchange. Contracts for the section to Island Road presumably will be let in 1978. If more than two years are allowed for grading and drainage, and two years for paving, the earliest feasible completion date will be mid-1982 according to the Alabama Department of Highways. This highway will initially connect with Island and Rangeline Roads at a grade intersection, but "ultimate" plans call for Rangeline to continue south as a limited-access expressway with service roads. The importance of the Rangeline Expressway is obvious. Net reductions should occur in Island Road traffic on both sides of Rangeline, since the saving of 3 kilometers (2 miles) to points north on I-10 will attract some of the Rangeline traffic that presently heads east to the Parkway corridor, as well as traffic that already utilizes the I-10/U.S. 90 corridor.

Eslava Creek Freeway

The Mobile Area Transportation Study was somewhat optimistic regarding the transportation facilities to be available by 1995. One of the facilities envisioned in the MATS plan was the Eslava Creek Freeway, which would form an inner loop roughly halfway between downtown Mobile and I-65. The Freeway would cross I-10 between I-65 and the Dauphin Island Parkway; head south on a course roughly parallel to the Parkway; and then head west across Dog River to terminate at a point on Rangeline Expressway roughly midway between I-10 and Island Road. Planners at SARPC now consider this project to be highly unlikely, at least insofar as it involves a limited-access freeway. The elimination of this route as a possibility by 1995 has major implications for the forecasted traffic volumes on other highways, as is discussed in the baseline forecast section.

Laurendine Road

This east-west route is important because industrial development is likely to extend as far south as Laurendine eventually, although only one land parcel that is officially part of the Industrial Park is located less than one mile from this road. Laurendine Road is presently in good condition and easily accommodates the existing traffic flows, in part because virtually none of the frontage along Laurendine is presently developed. The need for future improvements will depend primarily upon: (1) traffic generation by future industrial establishments or residential development on Laurendine; (2) possible large-scale residential growth in the Dauphin Island Parkway corridor; and (3) residential development in the Bellingrath Road area if it is specifically oriented to Industrial Park workers.

In summary, relief from existing traffic problems in the vicinity of Theodore Industrial Park will come in two stages: with the widening and signalization of Island Road; and with the completion of Rangeline Expressway. Traffic conditions in the future should be satisfactory unless one of these projects is delayed, or unless traffic flows increase so rapidly as to make these improvements inadequate by 1990.

EDUCATIONAL FACILITIES

The South Mobile county planning area roughly coincides with service area "E" of the Mobile County public school system. Within this area, the school system operates seven elementary schools, one middle school, and three high schools. One of the elementary schools is at Hollingers Island and three are in the Theodore/Tillman's Corner area (namely Griggs, Davis, and Burroughs). The remaining elementary schools are located in Grand Bay, Dixon's Corner, and Dauphin Island, with grades 1 through 6 also offered at the Alba High School in Bayou La Batre. Grades 7 and 8 are taught at St. Elmo Middle School, at the Mobile County High School in Grand Bay, and at Alba. The location of St. Elmo school roughly in the middle of the planning area is somewhat unfortunate, in that it is off-center relative to the heavily-populated northeast area which this facility must serve.

The total enrollment of public schools in South Mobile County has increased at an average rate of about 1 percent per year, from 8,859 in the 1970-71 school year to 9,416 in 1976-77. As is discussed in the forecast section, this rate of increase is significantly lower than would normally be expected given the 4 percent annual increase in population. Nevertheless, the expansion in enrollment since 1960 has created some overcrowding problems in South Mobile County schools. This circumstance is documented in Table B.P.S.19, taken from the "Development Management Plan for South Mobile County." The estimates of classroom capacity shown in the table indicate that 5 of the 11 schools were operating over capacity in 1975. The problems of overcrowding and obsolescence were cited as "critical" by the authors of the Development Management Plan. Noted in particular was the lack of high school facilities needed for a modern curriculum. In the two years since the Plan was written, no new buildings have been constructed, but new facilities have been provided in the form of portable equipment. There remains a lack of vocational facilities in South Mobile County.

Table B.P.S.19. Public Schools Serving South Mobile County

	Location	Site Size (Acres)	Grades Supervised	Number of Classrooms	Estimated Capacity	9/15/75 Enrollment	Excess Enrollment
High Schools							
Alba High	Bayou La Batre	32	1 - 12	61	1830	1415	
Mobile County High	Grand Bay	19	7 - 12	40	1200	1047	
Theodore High	Theodore	22	8 - 12	77	2156	1689	
Middle Schools							
St. Elmo Middle	St. Elmo	15	7 - 8	23	644	1035	+391
Elementary Schools							
Burroughs Elem.	Theodore	12	1 - 6	17	476	424	
Dauphin Island	Dauphin Island	8	1 - 6	3	84	50	
Davis Elem.	Theodore	12	1 - 6	28	784	839	+ 55
Dixon Elem.	Dixon Corner	22	1 - 6	12	336	397	+ 61
Griggs Elem.	Theodore	20	1 - 6	30	840	1026	+186
Grand Bay Elem.	Grand Bay	22	1 - 6	29	812	918	+106
Hollingers Island	Hollingers Island	16	1 - 6	12	336	305	

Source: Community Development Consultants, Inc., 1976.

Facility planning in the Mobile County school system, which serves the entire county, has been hampered by several constraints. The school board can issue bonds for school construction up to 80 percent of borrowing capacity, which is based upon anticipated tax revenues. Normally, projects are not assigned priorities beyond the amount of money available. Of the new schools that were on the first priority list in 1975, only the Pilling Middle School in Mobile has been built to date. A major factor has been the existence of a 1961 court ruling pertaining to racial balance in the Mobile County school system. Legal testing of the consistency of proposed projects with this ruling has delayed new construction significantly. As of the present writing, a bond issue has been pending for two years awaiting court decision. The school board has in the meantime emphasized renovation of existing buildings. Although the legal questions could be resolved at any time, this factor has had a significant impact on facility planning.

The only projects in South Mobile County which presently have top priority are a new high school in Theodore, and possibly some vocational facilities in the southern part of the county. The imminent projects elsewhere in the county are Baker High School, to be located in the western district near the airport, and new schools at Satsuma and Toulminville/Shaw. Most of the plans for these facilities have already been drawn. The school board presently can borrow approximately 15 million dollars, and is owed about 7 million dollars by the State on a past bond issue. Assuming a minimum of 5 million dollars for a new 1500-student high school, the potentially available funds will perhaps be sufficient for the four schools just mentioned. The expansion of school facilities in South Mobile County beyond construction of the new high school at Theodore is uncertain.

A fortunate circumstance regarding the school system is that the Board of School Commissioners owns or controls over 9,300 hectares (23,000 acres) of land within Mobile County. In 1819, when the State of Alabama was admitted to the Union, the Act of Congress specifying the admission provided that each section numbered 16 in every township should be granted to the inhabitants of the township for the use of schools. The courts have since established the right of the Board of School Commissioners to direct and control the management of school lands in Mobile County. Until recent years, these holdings were not managed efficiently in terms of revenue production, but the income generated by school lands has averaged about $700,000 per year over the last five years. The major sources of revenue have been oil and gas royalties, the sale of timber, and agricultural production. A recent internal study ("A Plan for Reorganization of the Forestry Department," has proposed institutional changes which would lead to other uses of the land as well, such as long-term leases to commercial and industrial tenants (Mobile County Board of School Commissioners, Division of Business Affairs, 1975). The more valuable School Board holdings in South Mobile County include 150 hectares (370 acres) on Laurendine Road, bordering the Theodore Industrial Park; 389 hectares (960 acres) on Bellingrath Road near Theodore, which are highly suitable for residential or mixed-use development; and 324 hectares (800 acres) overlapping Interstate 10 north of St. Elmo. Development of these lands would not only yield revenue directly to the School Board, but would add significantly to the county tax base.

WATER AND SEWER SERVICE

There are at present only two self-contained sewer systems within the South Mobile County area, at Bayou La Batre and Dauphin Island. The Bayou La Batre system, operated by the Bayou La Batre Water and Sewer Board, is currently being expanded. Sewerage arrangements in the northern portion of the planning area are presently in a state of flux. Until recently, domestic sewer service has been provided only in the Tillman's Corner area, by way of an interceptor sewer to the Halls Mill Creek wastewater treatment plant operated by the Mobile Water and Sewer Board. The Halls Mill Creek system is in turn linked by force mains to the McDuffie Island treatment plant, which will receive all wastewater flows from the Halls Mill catchment when the Halls Mill Creek plant is phased out in 1978. This system also receives sanitary sewage (but not industrial waste) from the Theodore Industrial Park.

Sewer service has recently been extended to areas southwest and south of Tillman's Corner along old Pascagoula Road and U.S. 90; but most dwelling units in the Theodore, west Theodore, and Hollingers Island communities are still served by on-site septic systems. As was noted in the Development Management Plan for South Mobile County, page 46, the soil conditions in many parts of this area are poorly suited to the healthy operation of septic tank fields (SARPC, 1976). The Board of Water and Sewer Commissioners of the City of Mobile intends to deal with present waste disposal problems and future residential growth in this area by: (1) continued extension of sewer lines tying into the Halls Mill/McDuffie system; and (2) construction of the proposed Theodore-Fowl River wastewater treatment plant. Construction will begin shortly on sewer lines to serve the Hollingers Island community north of Deer River, so that the Water and Sewer Board should soon have the capability to provide service to the entire area north of the State Docks terminal railway. The Theodore-Fowl River plant will be constructed in 3 to 6 years, probably at a site on Rangeline Road in the Industrial Park, and will serve an area extending as far south as Laurendine Road and as far west as Irvington.

Residential areas in South Mobile County are served by four public water systems, which are operated by the Bayou La Batre Water and Sewer Board, the Dauphin Island Property Owners Association, the Grand Bay Waterworks Board, and the Mobile County Water and Fire Protection Authority (the last serving the Tillman's Corner-Theodore-Hollingers Island area). Information from the Development Management Plan indicates that by 1975 public water was available to roughly half of all dwelling units in each of the Theodore, Grand Bay, and Bayou La Batre census divisions. All water provided by these systems is obtained from wells, numbering four in the Theodore area, two in Grand Bay, one in Bayou La Batre, and three in Dauphin Island. In addition to these water supplies, the Mobile Water and Sewer Board has water mains and storage facilities in the Theodore area to service the Industrial Park. The Water and Sewer Board obtains water from a reservoir built by the City of Mobile on Big Creek, and can fulfill any foreseeable demands for finished and raw water in the Industrial Park.

Recent population increases in the Theodore/Tillmans Corner area, and extensions of water service to existing residents, have caused water demand to approach the capacity of the existing wells operated by the Mobile County Water and Fire Protection Authority. Thus, water supply could possibly be constraining upon future growth. The anticipated solution to this problem will be the purchase of the Authority by the Mobile Water and Sewer Board, which already has facilities near the Industrial Park and possesses the legal authority to serve residential customers in the area as well. Based upon this possibility, plans have been prepared by SARPC which show water service being extended outward from Theodore in stages so that virtually the entire South County area will have public water by the year 2000.

HEALTH FACILITIES

Health services and facilities available within the area are extremely limited and consist of three physicians practicing in the Theodore area, a 53-bed nursing home in Grand Bay, and a mobile medical bus operating out of the Theodore Neighborhood Service Building about twice a month. As there are no hospitals or clinics within the planning area, residents must use one of the six facilities elsewhere in the county. Information regarding these facilities is presented in Table B.P.S.20.

Access to physicians is not highly favorable because of the shortage of doctors in the planning area and the fact that there are inadequate numbers of physicians within the Mobile SMSA. Compared to a national average of 125 physicians per 100,000 population, the Mobile SMSA has only 101 per 100,000. According to SARPC's Development Management Program, there is also a shortage of dentists. The U.S. Department of Health, Education, and Welfare defines a dentist-to-population ratio of 1:3,000 as critical; whereas the Mobile SMSA has 1 dentist per 2,859 persons.

There is only one nursing home in South Mobile County, a 53-bed facility located in Grand Bay. This facility does not conform to minimum safety standards set by the U.S. Public Health Service. The Mobile County Board of Health offers a comprehensive program of health services. However, virtually all of these services are offered at clinics in Mobile rather than facilities in the suburban area.

Table B.P.S.20. Existing Hospital Bed Capacity*, Mobile County, Alabama

	Existing Bed Capacity	Licensed Capacity	Occupancy Rate†
U.S.A. Medical Center**	357	262	82.8%
Mobile Infirmary	583	568	86.3%
Providence	378	378	77.5%
Doctors	229	229	51.0%
Springhill Memorial	150	---	----
Suburban	32	38	68.4%

* Alabama Master Hospital Plan, 1975. Survey period October 1972-73.
† Computed on licensed capacity as reported in Alabama Master Hospital Plan, as current 1975.
** Does not include 56 psychiatric beds.

Source: SARPC, 1975.

POLICE AND FIRE PROTECTION

The Mobile Police Department serves the City of Mobile and a 3-mile (4.8-kilometer) perimeter beyond the city limits. This area includes Hollingers Island, the Theodore Industrial Park, part of the Theodore community, and Tillmans Corner. The Mobile Police Department employs 319 full-time and 51 part-time officers. The other municipal police department serving south Mobile County is at Bayou La Batre. A total of 10 police officers are employed to patrol Bayou La Batre and a 3-mile perimeter area.

Police protection for most of the south county area is provided by Mobile County Sheriff's Department, which works closely with the city police. The Sheriff's Department employs approximately 85 deputies, a number which has not increased in the past five years. The Sheriff's Department is headquartered in downtown Mobile, but has recently opened a new substation in the Theodore area. The county has just purchased 43 new patrol cars, some to replace existing equipment and some as part of a conversion to the one man/one car concept of law enforcement. Since 1970, crime has increased at a moderate but significant rate in South Mobile County. However, the Sheriff's Department is hopeful of achieving a reduction in crime for 1977.

Fire protection is provided in South Mobile County by the Mobile County Water and Fire Protection Agency, the Bayou La Batre Fire Department, and four rural fire fighting organizations. The Mobile County Water and Fire Protection Agency has two fire stations in the Theodore area, one on Highway 90 near the Old Theodore Community and the second on Admiral Simmes Drive at Tillmans Corner. Both stations were constructed in 1967 and are presently in good condition. Each is equipped with a single 1,900-liter (500-gallon) pumper and manned by volunteer personnel. The Bayou La Batre Fire Department is located at the City Hall in Bayou La Batre. It is equipped with two 1,900 liter (500-gallon) pumpers, one 950-liter (250-gallon) pickup tanker, and an emergency rescue truck. The station, constructed in 1975, maintains a staff of four permanent personnel and 20 volunteers.

The rural fire protection organizations serving the area are located at Alabama Port, Fowl River, Grand Bay and Dauphin Island. Unfortunately, there are no water lines throughout the Alabama Port and Fowl River service areas so protection is limited. Grand Bay has water supply lines extending north of the central community but these are not equipped with regularly spaced fire hydrants. There are, however, flush hydrants on dead-end sections of the water lines that can be used to refill the pumpers. Dauphin Island water lines are equipped with hydrants to provide direct fire protection within much of the service area.

RECREATION AND OPEN SPACE

In spite of expanding urbanization, South Mobile County has retained its predominantly rural character. Although recreation and open space needs have not received major attention, the recreational facilities available in the planning area are rated as good by the Development Management Plan, due in part to the presence of tourist-oriented activities. These privately-owned facilities account for approximately 75 percent of all recreational opportunities in South Mobile County. An inventory of recreational facilities prepared by SARPC is presented here as Table B.P.S.21.

Table B.P.S.21. Inventory of Recreational Facilities in South Mobile County

Name of Facility	Location	Description	Ownership	Activities	Estimated Annual Visits
Historic					
Fort Gaines	East end of Dauphin Island	Built in 1821; guarded Mobile Bay during Civil War	State	Museum, sightseeing	23,000
Shell Banks	Alabama Marine Resources Lab, Dauphin Island	Aboriginal mounds	State	Sightseeing	NA
Battery Site	Bayou La Batre	Historical site	Private	History	NA
Fishing-Boating					
Fishing Fleets	Bayou La Batre, Coden, Dauphin Island	Vessels used in fishing industry	Private vessels	Sightseeing, photography	NA
East Fowl River	Southeast corner of county	Year-round flow, minor flooding, minimal pollution	Private shoreline	Fishing, boating	NA
Dog River	East-central part of county	Year-round flow, minor flooding, moderately polluted	Private shoreline	Water skiing, fishing, boating	NA
Gulf Fishing and Boating Club	Highway 168	Fishing	Private	Fishing, boating	10,400
Bayley's Marina	East Fowl River	1.2 hectares, 3 acres	Private	Fishing, boating, picnicking	11,050
Beachcomber Marina	Dog River	17.4 hectares, 43 acres	Private	Sailing, boating	2,000
Dog River Marina	Dog River	7.3 hectares, 13 acres	Private	Sailing, boating, fishing	13,250

Table B.P.5.21. Inventory of Recreational Facilities in South Mobile County (continued)

Name of Facility	Location	Description	Ownership	Activities	Estimated Annual Visits
Frost Marina	Dog River	11.3 hectares, 28 acres	Private	Sailing, boating, fishing	2,000
Dauphin Island Marina	Dauphin Island	6.9 hectares, 17 acres	Private	Sailing, boating, fishing	23,000
Buccaneer Yacht Club	Mobile Bay near Dog River	2.0 hectares, 5 acres	Private	Sailing, boating, swimming	52,000
Dauphin Island Beach and Gulf of Mexico	Dauphin Island	Beaches and shoreline	Private and public	Swimming, sunning, surfing	NA
Utopia Club	Mobile Bay near Highway 163	Recreation area 0.3 hectares, 0.8 acres	Private	Picnicking, swimming, boating	600
Cadillac Square	East Dauphin Island	2.0 hectares, 5 acres	County	Picnicking	20,000
Rolston Park	Bayou La Batre	4.4 hectares, 11 acres	City	Picnicking, tent camping, swimming	10,000
Nature-Sightseeing					
Audubon Bird Sanctuary	East end of Dauphin Island	Public bird sanctuary	County	Bird and animal watching	NA
Bellingrath Gardens	8 miles south of Theodore, County Highway 59	Floral gardens 28 hectares, 70 acres	Private	Sightseeing, photography	150,000
Sports					
Grand Bay Golf Course	South of Grand Bay	6.4 hectares, 16 acres	Private	Golf	250

Table B.P.S.21. Inventory of Recreational Facilities in South Mobile County (continued, page 3 of 3)

Name of Facility	Location	Description	Ownership	Activities	Estimated Annual Visits
St. Elmo Improve-	U.S. 90, St. Elmo	Ball diamonds	Private	Baseball, softball	3,000
Irvington Civic Athletic Association	Irvington	Ball diamonds 1.6 hectares, 4 acres	Private	Baseball, softball	3,500
Grand Bay Union Ball Park	Grand Bay	Ball diamonds 1.6 hectares, 4 acres	Private	Baseball, softball	25,000
Theodore Athletic Association	Theodore	Ball diamonds 3.6 hectares, 9 acres	Private	Baseball, softball, football	10,000
Mobile Drag Strip	Highway 163, south of Fowl River	64.7 hectares, 160 acres	Private	Drag racing	7,000
Isle Dauphin Club	South Dauphin Island	Country club 39.6 hectares, 98 acres	Private	Golf, tennis, swimming	6,600
Driftwood Country Club	North of Bayou La Batre	56.6 hectares, 140 acres	Private	Golf	NA
Mobile International Speedway	East of Irvington	Oval track	Private	Auto racing	NA
Mobile Greyhound Park	Northwest of Theodore	24.3 hectares, 10 acres	Private	Pari-mutual betting, dog racing	NA

Source: SARPC, 1968.

ELECTRIC AND NATURAL GAS SYSTEMS

Electric power is supplied to Mobile County by the Barry Steam Plant, located 37 kilometers (23 miles) north of Mobile with a capacity of 1,583,000 kilowatts, and a 120,000 kilowatt steam plant at Chickasaw. For peaking service, there are two combustion turbines located at Barry with a capacity of 60,000 kilowatts. Additional electric power is available through the Southern Company, an integrated power system made up of the Alabama, Mississippi and Georgia power companies. A 230,000 volt transmission line linking to the Alabama and Mississippi power companies passes through the planning area and connects to a 400,000-kilowatt transmission substation in the Theodore Area. The Theodore Industrial Park and surrounding areas are served by 115,000 volt lines. Other developing areas are served by 46,000 volt lines. Supplementary power can be made available to the Mobile area from two power plants of approximately 870,000 kilowatt capacity each, one steam and one nuclear, which have recently been constructed near Dothan, Alabama.

Natural gas is provided to the planning area by two distribution systems, both of which receive their supplies from the United Gas Pipeline Company. The Mobile Gas Corporation serves a limited number of industrial customers in Theodore Industrial Park, while residential areas of Theodore and Bayou La Batre are served by the Mobile County Gas District. Although there are abundant natural gas reserves in the Mobile region, both of the local gas suppliers are currently experiencing shortages due to curtailment proceedings and therefore are limiting further service connections.

LOCAL LAND USE

Existing land uses within about 3 kilometers (2 miles) of the Ideal Basic plant site have been surveyed intensively as part of the present impact assessment. The resulting land use map is shown here as Figure B.P.S.2. The areas covered include Theodore Industrial Park, the Hollingers Island community, and the Dauphin Island Parkway corridor from Deer River to Laurendine Road. A very large proportion of the land in this section is currently vacant--i.e., not used for any purpose other than possibly hunting and harvesting of forest products. Some of this land has been disturbed by past activities, most notably a tract exceeding 40 hectares (100 acres) near the State Docks terminal which has apparently been used for disposal of dredge materials. The other major land use categories are the following, arranged roughly in decreasing order of importance.

Industry

Virtually all of the land within 3 kilometers (2 miles) west and southwest of the Ideal Basic site is either held by manufacturing firms or is being marketed actively for industrial use. Although well under half of this land is actually occupied by industrial establishments at the present time, industry far exceeds all other land uses, except residential land use, in terms of area.

Residential Land

The area near the plant site is quite sparsely settled, relative to what might be expected given its proximity to Mobile. In order to supplement the information available from aerial photographs (which were approximately two years old), a field count of all dwelling units within 5 kilometers (3 miles) of the plant site was made as part of the present study. The findings are summarized in Table B.P.S.22. The area within 5 kilometers (3 miles) is found to contain 974 dwelling units and approximately 3,053 residents, amounting to about one dwelling unit for every 7.7 hectares (19 acres) and one person for every 2.4 hectares

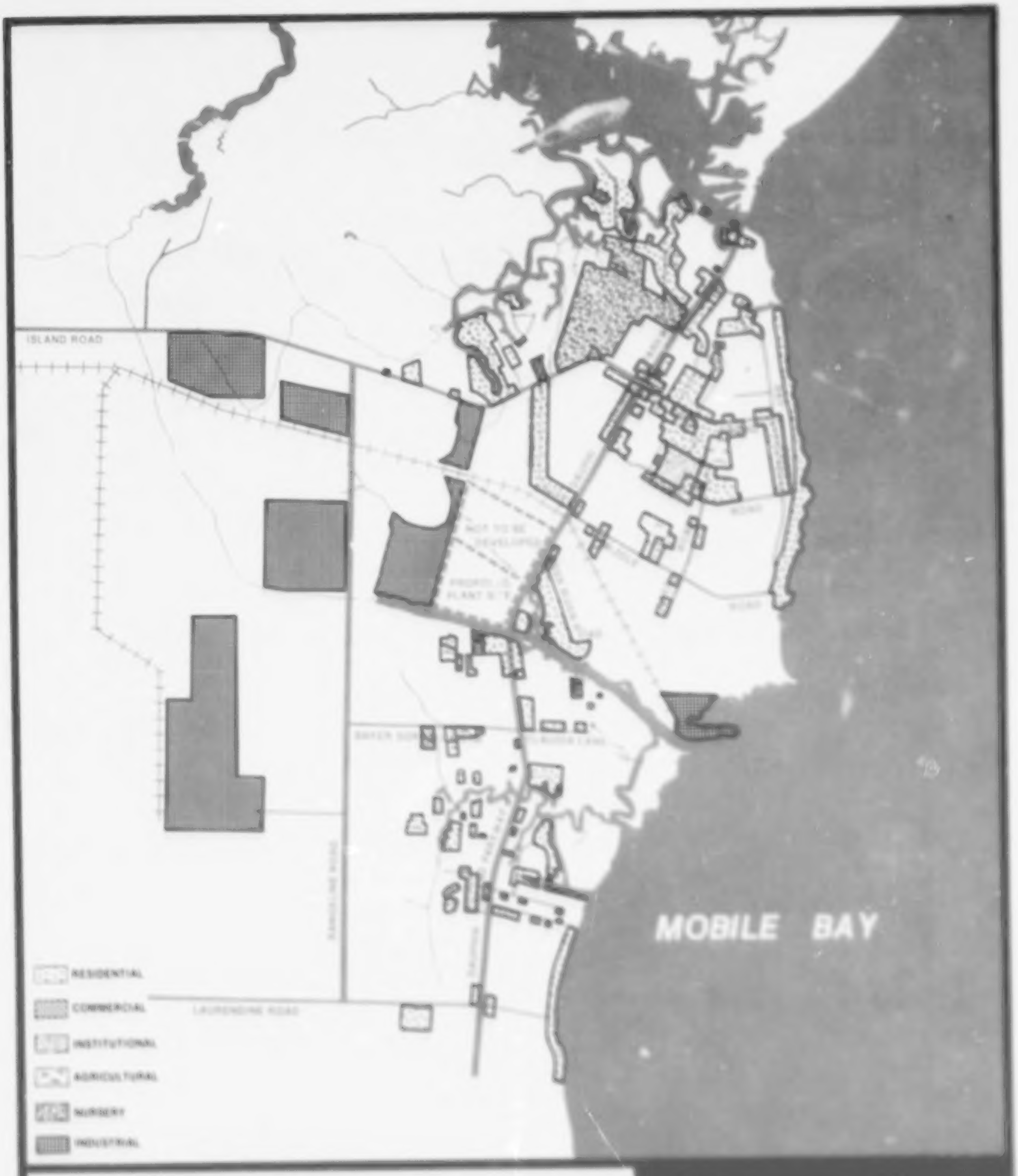

ISLAND ROAD
NOT TO BE DEVELOPED
PROPOSED PLANT SITE
RANGELINE ROAD
LAURENDINE ROAD
MOBILE BAY
RESIDENTIAL
COMMERCIAL
INSTITUTIONAL
AGRICULTURAL
NURSERY
INDUSTRIAL
0 0.5 1
SCALE IN KILOMETERS
N

Figure B.P.S.2
PRESENT LAND USE IN THE VICINITY OF THE PROPOSED IDEAL BASIC INDUSTRIES PLANT SITE, 1992

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION
AGENCY ENVIRONMENTAL IMPACT
STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

Table B.P.S.22. Dwelling Units and Population Near the Proposed Ideal Basic Site as of August, 1977.

Distance from Center of Ideal Basic Site*	Number		Number per Acre†	
	Dwelling Units	Residents (approx.)	Dwelling Units	Residents (approx.)
Within 1 mile	115	361	0.063	0.196
Within 2 miles	591	1,853	0.075	0.236
Within 3 miles	974	3,053	0.054	0.170

* The central point was located in the southern portion of the site where the actual development would occur.

† The acreage of the Ideal Basic property was omitted when computing densities.

Source: Environmental Science and Engineering, Inc., 1977.

(6 acres). The densities are slightly higher for the area within 1.6 kilometers (1 mile) of the Ideal Basic Industries site. These figures are somewhat deceptive, in the sense that the residential population actually is concentrated in a few areas rather than distributed widely at low density. The important point is that the overall levels of residential development are relatively low.

Residential land uses in the area tend to consist of two single-family housing types, namely water-oriented homes and fairly modest middle-income housing. The former dwellings are located in waterfront areas on Alligator Bayou, Dog River, Deer River, and Mobile Bay. A substantial number of these homes obtain water access by means of artificial channels connecting to the rivers just mentioned. The waterfront and adjacent areas account for the great majority of dwellings with present market values exceeding $40,000. The inland areas contain a substantial variety of structural housing types, including mobile homes. These units are concentrated in the $20,000 to $30,000 value range, with the exception of mobile homes, some relatively old units, and a few high-value units on large lots. New residential construction is occurring primarily in the portion of the Parkway corridor about 3 to 5 kilometers (2 to 3 miles) south of the Ideal Basic Industries site.

Transportation Land

The area utilized for transportation includes street and highway rights-of-way, the terminal spur railroad, and the Theodore Barge Canal. This land use will increase very significantly with construction of the Theodore Ship Channel, the extension of the barge canal west of Rangeline Road, and the possible construction of bulk terminal facilities on the canal and Mobile Bay waterfront. The ship channel right-of-way will be between 200 and 300 meters (700 to 1,000 feet) wide over the 2.6 kilometer (1.6 mile) distance from Mobile Bay to the turning basin; and the turning basin will occupy some 17 hectares (42 acres) (see map of future land use in the forecast section).

Agriculture and Nurseries

The Dauphin Island Parkway corridor contains a number of plant nurseries, by far the largest being an establishment at the Parkway/Island Road intersection which covers nearly 80 hectares (200 acres). Other agricultural land within 3 kilometers (2 miles) of the Ideal Basic Industries site is limited to a few small fields and garden plots. However, there is a large amount of agricultural land just beyond this radius, to the west and southwest of the Industrial Park.

Industrial, Commercial and Recreational Land

The institutional land within the area under consideration is limited to five small churches on Dauphin Island Parkway and the Hollingers Island Elementary School on Hammock Road. Commercial development consists of fewer than ten retail establishments, several no longer operating, and two marinas on Dog River. (Two other establishments providing boat repairs are classed here as industrial.) The only land utilized exclusively for recreation other than the elementary school grounds is the park area on Bay Road belonging to the Hollingers Island Community Association. However, a commercial campground and a Boys' Club of America camp are located about 5 kilometers (3 miles) to the north of the Ideal Basic site.

GENERAL PLANNING ISSUES

In the past, there has not been a strong tradition of long-range planning in Mobile County, except for the activities of SARPC. The Development Management Plan noted in 1975 that county government was somewhat fragmented, with insufficient coordination of agency programs. County agencies tended to respond to public needs on an *ad hoc* basis rather than as part of an orderly capital programming process. These conditions reportedly have improved in recent years, however.

The county possesses very little ability to influence land development patterns, due to the lack of zoning in unincorporated areas. Subdivision review is exercised by the City of Mobile for land within 3 miles of the Mobile city limit, but is not required in other unincorporated areas of the county. Building permits are required only for properties that are wholly or partly contained in flood zone "A" (less than 10 feet above mean sea level), as specified by the Federal Flood Insurance Program. Mechanisms are therefore lacking to guide land use patterns so that public services could be provided at minimal cost.

Some difficulties in providing adequate public services in rural areas and new suburban areas of Alabama are due to general characteristics of governmental structure in the state. The *Development Management Plan for South Mobile County*, Part IV, Appendix A, has stated that:

> Local governments may exercise only those powers affirmatively conferred upon them by statute or constitutional provision. Powers available to county governments in Alabama are not sufficient to meet the needs of urbanization in unincorporated areas (SARPC, 1976).

To deal with this situation, the Development Management Plan has recommended an amendment to the State constitution which would confer on local government all powers not expressly denied or limited by State law or constitution. An alternative solution--which has been utilized extensively in Alabama--is the incorporation of areas subject to population growth, by annexing them to the central city or by forming separate suburban towns.

Table B.P.S.23 demonstrates the extent to which incorporation was used to deal with suburban growth in the four major Alabama metropolitan areas between 1960 and 1970. In all four cases except Huntsville, there were population declines within the 1960 boundaries of incorporated areas, but the number of inhabitants increased substantially in the remaining portion of each SMSA. The response in each case was the incorporation of outlying areas containing substantial shares of the suburban growth. In the Birmingham SMSA, the areas annexed between 1960 and 1970 contained a 1970 population equal to 48 percent of the overall suburban population increase. The corresponding percentages for the Huntsville SMSA and the Montgomery SMSA were 85.1 percent and 87.6 percent, respectively. In the latter two cases, annexation was so extensive that there was very little change in the number of persons residing outside incorporated areas. The annexations in the Birmingham SMSA primarily involved suburban towns, whereas in the Huntsville and Montgomery SMSA's the central cities acquired the major shares of annexed population.

The last column of the table indicates that annexation was less prevalent in the Mobile SMSA than elsewhere. Annexation "captured" only about 22 percent of the suburban population growth in the Mobile SMSA during 1960-70 (i.e., the population growth outside 1960 corporate limits). As a result, the population of unincorporated areas--representing the burden on county governments--increased by 21.2 percent between 1960 and 1970, as compared with 12.5 percent in the Birmingham SMSA, 5.4 percent in the Huntsville SMSA, and 3.8 percent in the Montgomery SMSA.

Incorporation has been raised as an issue in South Mobile County on several occasions but has been rejected for a variety of reasons. The possibilities would include annexation of adjacent areas by the City of Mobile, or formation of one or more new cities. Without commenting upon the overall advantages or disadvantages of such a plan, it is clear that

Table B.P.S.23. Annexation in Alabama Metropolitan Areas, 1960-1970

	Birmingham SMSA	Huntsville SMSA	Montgomery SMSA	Mobile SMSA
Total Population, 1960	721,207	153,861	199,734	363,389
Population Change, 1960-1970				
Inside 1960 corporate boundaries*	-39,441	48,168	-16,628	-11,366
Outside 1960 corporate boundaries:				
Annexed by central city	2,470	17,366	14,888	432
Annexed by other cities	25,129	4,933	1,080	4,964
Other	29,909	3,911	2,251	19,271
(Subtotal)	(57,508)	(26,210)	(18,219)	(24,667)
Total population change	18,067	74,378	1,591	13,301
Percent Distribution of Population Change Outside 1960 Corporate Boundaries				
Annexed by central city	4.3%	66.3%	81.7%	1.8%
Annexed by other cities	43.7%	18.8%	5.9%	20.1%
Other	52.0%	14.9%	12.4%	78.1%

* NOTE: Only incorporated areas with 1960 populations exceeding 2,000 persons were considered.

Source: U.S. Bureau of the Census, 1971.

incorporation would have benefits in terms of land use control and perhaps other public functions.

PROJECTED 1992 ENVIRONMENT

FUTURE POPULATION AND ECONOMY

The present study draws upon an up-to-date series of economic and demographic forecasts prepared by the regional planning agency, SARPC, as input to the Comprehensive Water Quality Management Planning program and other planning activities. This introductory section will discuss the factors which are generally considered most important to the growth of the Mobile area. The second section reviews and develops specific forecasts.

Theodore Industrial Park and Ship Channel

Development of the Theodore Industrial Park located directly south of Mobile has been a joint enterprise of the Alabama State Docks Department and the Mobile Industrial Development Board. Most of the 1,780 hectares (4,400 acres) in the park were originally part of an ammunition depot which was last used in World War II. This facility was served by a rail line, a dock area, and a deepwater ship channel (the Hollingers Island Channel) which has silted due to lack of maintenance but which will still accommodate 3.7-meter (12-foot) draft barges. Following acquisition of the depot land by State Docks, a barge canal with 3.7-meter (12-foot) depth was driven inland along the course of the Middle Fork Deer River to Rangeline Road. In the future, the canal will extend further into the park to serve Kerr McGee and other properties.

Sales of Theodore Industrial Park properties to manufacturing firms, followed by announcements of major investment plans, have occurred rapidly. The facilities already in operation represent roughly one-third of a billion dollars in investment and include the Degussa and Kerr McGee chemical plants, Mobile Paint Manufacturing Company, Union Carbide Corporation, AIRCO, Inc. (ferro-alloys), Marion Corporation (refinery products), Barnett Millworks, and Hallmark Homes. However, several very large investments that were planned as of 1973 or 1974 have failed to materialize. The more than 360 hectares (900 acres) of land just outside the Theodore Industrial Park which were formerly controlled by North Atlantic Oil are now being marketed to other potential corporate buyers.

Future industrial development in the Theodore area has been closely identified with construction of the Theodore Ship Channel by the Corps of Engineers. The ship channel would bring deep-water access to the Park area by means of a channel extending diagonally from the main ship channel in Mobile Bay to the mouth of Deer River, and a land cut replacing the present barge canal east of Rangeline Road. The project would provide 12.2-meter (40-foot) depth and 91-meter (300-foot) width throughout, with a 17-hectare (42-acre) turning basin located near the western end of the land cut. The construction of the ship channel is generally considered definite, although delays in the project are possible. One of the developments which have been linked with completion of the ship channel is the construction of a proposed cargo handling facility by State Docks, for which there is no timetable as yet.

Tennessee-Tombigbee Waterway

The construction of the Tennessee-Tombigbee Waterway, at a total project cost exceeding $1 billion, will provide direct water access from the Port of Mobile to the nation's interior via a channel extending from Demopolis Lock and Dam on the Tombigbee-Black Warrior River to Pickwick Reservoir on the Tennessee River. Channel depth will be 3.7 meters (12 feet) in the Tombigbee River sections and 2.7 meters (9 feet) in the divide cut. The ten locks will have a total lift of 104 meters (341 feet). Completion of the project has been projected for 1981, but possibly may not occur until somewhat later.

The potential importance of the Tennessee-Tombigbee Waterway to port-related economic activities in Mobile is based on the fact that the project will shorten the water distance from Mobile and points east to all locations on the Mississippi River and its tributaries above Cairo. Although the ability of the new waterway to divert barge traffic from

New Orleans will be somewhat limited by constraints on the size of tows that can be accommodated, the waterway will be extremely important as a slack-water shortcut to the Tennessee, Cumberland, and Ohio Rivers. An early canvas of industrial firms by the Corps of Engineers, later updated to 1971 by the Gulf South Research Institute, has indicated that waterborne commerce along the Tennessee-Tombigbee Waterway would include 0.493 million metric tons (0.544 million tons) originating at Mobile Harbor and 0.443 million metric tons (0.488 million tons) having a destination there. The Corps has estimated conservatively that the traffic occurring soon after completion of the waterway will increase by roughly 2 percent per year over the following 50 years.

Planners at SARPC feel that the opening of the waterway will provide an immediate stimulus to the Mobile area economy through the increase in cargo-handling activities, followed by long-term effects upon manufacturing employment.

Petroleum-Related Development

The potential influence of petroleum and natural gas upon the Mobile economy involves both the extraction of oil and gas *per se* and the possibility of new refinery capacity in the area. Oil is presently being produced in both Mobile and Baldwin Counties, and in Escambia County to the east. The largest producer in the past has been the Citronelle field in northern Mobile County, which has yielded more than 15.9 kiloliters (100 million barrels) of oil since 1955. Two recently discovered fields in Mobile County (Chunchula and Creola) could possibly be more lucrative. In Escambia County, a number of fields are now yielding significant quantities of oil, natural gas, and gas condensate. The array of processing plants, storage facilities, and pipelines serving these fields now provide about 300 jobs. Similar facilities can be expected to develop in Mobile County, adding to the economic stimulus provided by lease payments to local landowners. In addition to these onshore drilling activities, several major oil companies have conducted offshore exploration in the eastern Gulf of Mexico.

The recoverable reserves of oil and particularly natural gas in the Mobile region are potentially very large. However, the rates at which exploration and production take place in the future will be highly dependent upon such external factors as federal programs to limit oil importation and the possible de-regulation of natural gas prices. If large-scale increases in production do occur, the greatest economic impacts are likely not to involve the extraction process *per se* but rather the impetus provided for related activities such as oil refining, and the general role of energy availability in stimulating industrial growth.

In 1972 and 1973, the Ameraport Corporation of Alabama sponsored a major study to determine the feasibility of locating a deep water port off Alabama to service supertankers, whose drafts in excess of 27 meters (90 feet) preclude entrance to most American ports. Tankers would dock at a monobuoy located approximately 45 kilometers (28 miles) southwest of the Mobile County coastline in the Gulf of Mexico, from which oil would be pumped to receiving facilities onshore. The study by Batelle Institute indicated that this facility would generate about $2 billion in onshore investment, including perhaps four refineries and various secondary industries. However, the prospects for such a development have been lessened by political and economic circumstances, particularly the Arab oil embargo and the subsequently announced intentions of U.S. policymakers to attain energy independence.

Regional planners now tend to discount the possibility of a major oil refinery complex in the Mobile SMSA, although new small-scale facilities such as the Marion Corporation refinery of Theodore can be expected. It is noted that there has not been major refinery construction in the U.S. since 1973, and that U.S. refineries are presently operating below capacity. However, oil companies are reportedly still among the potential buyers of industrial land in the Theodore area, so the possibility of an economic stimulus of this type should perhaps not be ruled out.

POPULATION FORECASTS

The economic factors discussed above appear to be a sufficient basis for projecting sustained economic growth and population increases for the Mobile SMSA. Table B.P.S.24 presents the most recent population forecasts for the area. Two of these forecasts have been prepared by SARPC and one is the current OBERS projection released by the Alabama Development Office. The lower portion of the table indicates the annual percentage growth rates (compounded yearly) which are implied by each forecast series in each time interval.

Referring first to the right-hand columns of Table B.P.S.24, which deal with total SMSA population, the primary difference between forecasts is that both of the SARPC series are somewhat higher than the OBERS projection. The current SARPC series is virtually the same through the year 1990 as the forecast prepared in the 1975 Population and Economy (P&E) study. The projected 1990 populations are 471,900 persons and 470,600 persons, respectively; both figures are roughly 3 percent higher than the OBERS projection of 457,900 persons in 1990. As the lower right-hand portion of Table B.P.S.24 shows, the differences between the SARPC and OBERS forecasts are due largely to differences in assumed growth rates during the current decade. The SARPC projections imply annual growth rates of 1.3 to 1.4 percent during 1970-1980, versus an average rate of 1.01 percent in the OBERS series. Thereafter, the implied annual growth rates are similar, amounting to about 0.9 percent per year during the 1980-1990 decade and 0.3 or 0.4 percent after 1990. The overall percentage change from 1980 to the year 2000 is in fact higher in the OBERS series than in either of the SARPC projections.

The most recent census estimates of Mobile SMSA population would tend to support the SARPC projections rather than OBERS. The estimated 1975 population of 403,341 represents an average annual growth rate since 1970 of 1.38 percent, which, if extended to 1980, would result in a population of 431,900. This is slightly higher than either of the SARPC

Table B.P.S.24. Projected Mobile SMSA Population, in Thousands of Persons

	Mobile County		Baldwin County			Total SMSA		
	SARPC	OBERS	SARPC P&E	SARPC Current	OBERS	SARPC P&E	SARPC Current	OBERS
Population								
1970	317.3	317.3	59.4	59.4	59.4	376.7	376.7	376.7
1975	334.9	-----	66.4	66.4	-----	401.3	401.3	-----
1980	358.8	345.4	72.0	71.8	71.1	430.8	430.6	416.5
1985	379.5	-----	74.8	76.0	-----	454.3	455.5	-----
1990	391.2	376.6	79.4	80.7	81.3	470.6	471.9	457.9
1995	397.3	-----	80.3	84.3	-----	477.6	481.6	-----
2000	403.8	388.7	81.7	88.0	88.0	485.5	491.8	476.7
Annual Rate of Increase (Percent)								
1970-1975	1.1	0.85	2.3	2.3	1.82	1.3	1.3	1.01
1975-1980	1.4	0.85	1.6	1.6	1.82	1.4	1.4	1.01
1980-1985	1.1	0.87	0.8	1.1	1.35	1.1	1.1	0.95
1985-1990	0.6	0.87	1.2	1.2	1.35	0.7	0.7	0.95
1990-1995	0.3	0.32	0.2	0.9	0.80	0.3	0.4	0.40
1995-2000	0.3	0.32	0.3	0.9	0.80	0.3	0.4	0.40

Sources: SARPC, 1975; 1977.

projections for 1980, and substantially higher than OBERS. The overall rate of population growth in the second half of the present decade could easily equal the rate during the first half, for two reasons: (1) resident employment has increased very rapidly between 1975 and 1977, although a moderate slowdown can perhaps be expected in 1978 due to layoffs at Ingalls; and (2) strong economic expansion did not take hold in the first half of the decade until after 1972. Therefore, the SARPC figures for 1980 are considered to be more reasonable than OBERS. If the difference between these 1980 figures is considered to be a net gain which is maintained in future periods, it is logical to utilize one of the SARPC series rather than OBERS as the baseline forecast for present purposes.

As the left-hand columns of Table B.P.S.24 indicate, the differences between the two SARPC forecasts after 1990 are due entirely to revisions in the Baldwin County projections. SARPC planners have reported that, when allocating county populations to small areas as part of current forecasting activities, it has not been possible to develop realistic population distributions for Baldwin County after 1990 using the control totals established by the Population and Economy study. Baldwin County population has therefore been increased relative to the P&E series by 4,000 in 1995 and 6,300 in the year 2000, with minor increases also in the years 1985 and 1990. The present study will utilize the current SARPC forecast rather than the P&E projection, in the belief that these changes are reasonable. The recent Census Bureau estimates indicate that the SARPC series for Baldwin County may in fact be somewhat low.

Table B.P.S.25 presents population forecasts for four component districts of Mobile County, obtained by aggregating the figures for incorporated and unincorporated areas developed by SARPC. As in the previous table, the lower portion of Table B.P.S.25 shows the annual percentage growth rates implied by the forecasts for various time intervals. The primary focus of attention here is the Suburban South district, which SARPC projects to attain a population of roughly 70,900 persons in the year 2000.

Table B.P.S.25. SARPC Population Projections for Mobile County

	Population, in Thousands*				
	1975	1980	1985	1990	2000
City of Mobile	200.8	212.3	215.6	218.9	225.5
North County Area (including Prichard, Chickasaw)	72.0	75.0	76.8	78.5	81.6
Suburban West	17.5	20.1	23.8	25.0	25.8
Suburban South	44.6	51.4	63.3	68.8	70.9
TOTAL	334.9	358.8	379.5	391.2	403.8

	Annual Rate of Increase, Percent			
	1975-80	1980-85	1985-90	1990-2000
City of Mobile	1.12	0.31	0.30	0.30
North County Area (including Prichard, Chickasaw)	0.81	0.47	0.45	0.39
Suburban West	2.82	3.43	0.97	0.31
Suburban South	2.91	4.27	1.68	0.30

* Population figures are subject to rounding error, but annual rates of increase have been computed using true figures.

Source: SARPC, 1977.

Population in the City of Mobile is projected to increase at an annual rate of 1.12 percent between 1975 and 1980, which appears somewhat high unless annexation is expected. Population is assumed to increase rapidly in the Suburban West and Suburban South districts between 1975 and 1985, with the growth rates for these areas much higher than the rates for the North County area (dominated by slow growth in Prichard and Chickasaw) and the City of Mobile. This pattern is expected in view of past trends in the SMSA and the experience of other metropolitan areas in the U.S. However, after 1990, the growth rates for the West and South are projected to fall to roughly the same level as the rates for Mobile and the North County. Given that the suburban areas will still contain the preponderance of prime buildable land in the county, and that population trends in Mobile and other established communities must continue to be affected by thinning of population in existing dwelling units, it is difficult to find justification for this growth pattern.

The population forecast by SARPC for South Mobile County in the year 2000 appears reasonable, but the projected growth is somewhat front-loaded. Therefore, an alternative allocation of the population growth over time is presented in Table B.P.S.26, dealing with the years 1977, 1985, 1992, and 2000. In this case, assumed annual growth rates are translated into population projections rather than vice versa, although the rates have been chosen so that the projection for the year 2000 agrees with the SARPC forecast. It is forecast that the average annual growth rate for the interval from 1977 to 1985 will be significantly lower than the rate prevailing before 1977 for two reasons. First, the impending layoffs at Ingalls could subtract between 2,500 and 5,000 persons from the potential population of South Mobile County (although employment trends at Ingalls beyond the 1978 readjustment are unknown). Second, it is expected that the completion of Interstate 10 east of Mobile will shift somewhat the balance of new suburban development between Mobile and Baldwin Counties by increasing the attractiveness of Baldwin County as a place of residence for persons working in the downtown and waterfront areas of Mobile. (The opening of Interstate 65 to the northeast could have a similar effect.) These factors will tend to

Table B.P.S.26. Projected Future Population in South Mobile County

Interval	Annual Rate of Change (%)	Change During Interval	Population at End of Interval
1960-1970	4.3	12,078	34,924
1970-1977	4.5	12,300	47,400
1977-1985	2.4	10,100	57,300
1985-1992	1.9	7,900	65,400
1992-2000	1.0	5,500	70,900

Source: Environmental Science and Engineering, Inc., 1977.

compensate for the positive influence of Theodore Industrial Park on South Mobile County population. The assumed annual rates of population growth in the South County area are 2.4 percent between 1977 and 1985, and 1.9 percent for the following 7 years. The assigned growth rate for the interval between 1992 and 2000 is 1.0 percent, which is felt to be the minimum rate consistent with any appreciable population growth in the Mobile SMSA as a whole.

Table B.P.S.27 gives population projections for individual census tracts in South Mobile County, which have been obtained by allocating the SARPC tract forecasts over time in a manner consistent with Table B.P.S.25 (see notes to Table B.P.S.27). The growth patterns thus indicated differ in several important respects from past trends. The rates of population increase in Tracts 68 and 69, representing the Tillman's Corner area, are expected to be much lower than during the period between 1970 and 1977, when this area accounted for nearly one-third of the overall population gain in South Mobile County. On the other hand, census tract 71 is expected to dominate population growth in both absolute and percentage terms, whereas the growth rate of this area was only average for South Mobile County prior to 1977. Tract 71 contains Theodore Industrial Park, and is bounded on the north by Island Road (Hamilton Road) and the State Docks terminal railway; on the northwest by Interstate 10; and on the southwest by Fowl River. SARPC has forecast that the population of this area will double, from roughly 8,000 to 16,000, between 1975 and the year 2000. This forecast would require large-scale residential development in at least two of the following areas: (1) the Dauphin Island Parkway corridor between Deer River and Fowl River; (2) the area immediately south of Laurendine Road; (3) the Bellingrath Road corridor; and (4) the area west of Theodore, between U.S. 90 and Interstate 10. At present only the West Theodore area is undergoing rapid growth, although this situation could change quickly following a few key decisions by developers.

The forecasts presented in Table B.P.S.27 indicate that Tract 70, located between Tract 71 and the Mobile city limit, will increase in population by only 28.6 percent over the next 15 years, or 1.7 percent

Table B.P.S.27. Population Projections for Census Tracts in South Mobile County

	1977	1985	1992	Change, 1977-1992 Number	Change, 1977-1992 Percent
Bayou La Batre Division					
Tract 72	3,260	3,830	4,290	1,030	31.6
Tract 73	5,440	6,010	6,470	1,030	18.9
(Subtotal)	(8,700)	(9,840)	(10,760)	(2,060)	(23.7)
Grand Bay Division					
Tract 65	4,840	5,640	6,290	1,450	30.0
Tract 66	3,690	4,290	4,790	1,100	29.8
Tract 67	5,320	6,830	8,070	2,750	51.7
(Subtotal)	(13,850)	(16,760)	(19,150)	(5,300)	(38.3)
Theodore Division					
Tract 68	5,060	5,810	6,430	1,370	27.1
Tract 69	6,210	7,530	8,610	2,400	38.6
Tract 70	4,830	5,590	6,210	1,380	28.6
Tract 71	8,750	11,770	14,240	5,490	62.7
(Subtotal)	(24,850)	(30,700)	(35,490)	(10,640)	(42.8)
TOTAL	47,400	57,300	65,400	18,000	38.0

Source: Derived by Environmental Science and Engineering, Inc., (1977) as follows: the previous table, along with the 1975 SARPC population estimate for South Mobile County, indicates that 10.4 percent, 48.2 percent, and 79.2 percent of the overall population growth between 1975 and 2000 will occur by the years 1977, 1985, and 1992, respectively. These percentages have been assumed to hold similarly for all census tracts, and have been applied to allocate the 1975-2000 population increases forecasted by SARPC for individual tracts.

per year. The growth rate of this area between 1970 and 1977 was approximately 4 percent per year. However, it could happen that some of the residential expansion projected by SARPC for Tract 71 will occur in Tract 70. There are three large parcels of land located north of Island Road which would become eligible for large-scale development when Island Road is improved and the Rangeline Expressway link to Interstate 10 is completed. Only one of the owners of these parcels is known to have given active consideration to development possibilities. These possibilities could eventually include commercial establishments on the Island Road frontage, with a mix of high-density and low-density residential development in the interior areas.

By providing estimates of the number of area residents working at the Industrial Park and other locations, Table B.P.S.28 indicates the extent to which population growth in South Mobile County will be linked to employment at Theodore Industrial Park. The 1975 Development Management Plan for South Mobile County predicted that total employment in the Industrial Park would reach 7,950 workers by the year 2000, based on SARPC forecasts of industrial employment in the region as a whole, and the proportion of recently announced industrial investments which would involve the Theodore area (SARPC, 1976). Table B.P.S.28 is based instead on the assumption that new jobs in the Industrial Park and vicinity will be provided at the recent rate of about 200 per year, making roughly 4,000 jobs in 1992 and 5,600 in the year 2000. On the other hand, 75 percent of these workers are assumed to live in South Mobile County, which is probably an overestimate. Total resident employment in South Mobile County is obtained in Table B.P.S.28 by extrapolating the employment-to-population ratio; and workers are allocated to other areas besides Theodore on the basis of best available knowledge. The table indicates that the Industrial Park will employ only about 12 percent of all workers living in South Mobile County in 1992; but it will provide 29 percent of the increase in resident employment during this 15-year period. This tabulation does not include the very substantial secondary employment impacts of industrial development at Theodore, since these

Table B.P.S.28. Future Place of Work of South Mobile County Residents

	1977	1985	1992
Total population	47,427	57,300	65,400
Employment/population ratio	0.365	0.38	0.39
Resident employees	17,310	21,800	25,500
Place of work:			
City of Mobile	6,900	8,400	9,400
Theodore Industrial Park area	660	1,900	3,000
Rest of Mobile County	6,100	8,400	10,000
Jackson County, Mississippi	3,600	3,000	3,000
Elsewhere	50	100	100

Source: Environmental Science and Engineering, Inc., 1977.

Table B.P.S.29. Household and Dwelling Unit Forecasts for South Mobile County

	1970	1977	1985	1992
Population (thousands)	34,924	47,430	57,100	65,500
Population in households	34,740	47,240	56,900	65,300
Persons per household	3.672	3.42	3.18	3.09
Number of households	9,460	13,820	17,900	21,100
Vacant dwellings:				
Seasonal	575	600	600	600
Available	282	280	400	500
Other	370	380	500	600
TOTAL DWELLING UNITS	10,687	15,080	19,400	22,800

Source: Environmental Science and Engineering, Inc., 1977.

are expected to be widely diffused throughout the Mobile economy rather than specific to the South County area.

Rough forecasts of household and dwelling unit trends in South Mobile County are presented in Table B.P.S.29. Assuming that the number of seasonal dwellings does not increase significantly, and that vacancy rates return to more normal levels than in 1977, the total number of dwellings units in the planning area is expected to increase from 15,080 in 1977 to 22,800 in 1992, a gain of over 50 percent. The expected rate of new residential construction will remain similar to recent rates: 610 units per year during the period from 1985 to 1992, as opposed to an average of 690 units before 1977.

FUTURE LAND USE

SARPC has prepared aggregate forecasts of land use in the year 2000 for major drainage basins in the Mobile SMSA. The estimated totals for the South Mobile County planning area are presented in Table B.P.S.30. Single-family residential land, the dominant use category, is projected to increase from 2,972 hectares (7,248 acres) in 1975, to 5,600 hectares (13,659 acres) in the year 2000, a gain of roughly 88 percent. All other categories of developed land other than wholesale trade land are forecasted to increase by even greater percentages, due to the expected broadening of economic activities in the South County area. The projected increase in industrial land from 461 hectares (1,124 acres) to 882 hectares (2,640 acres) is particularly notable.

A map of future land use in the vicinity of the proposed Ideal Basic Industries plant is presented in Figure B.P.S.3. Area-specific projections of land use are highly subject to error, even if general development trends are well-known, due to the large number of variables that affect the conversion of individual land parcels. The fact that there is no zoning code to serve as a guideline adds to the difficulty of forecasting in the present case. Therefore, the 1992 land use map is intended to be only a generalized representation of future conditions. The map depicts few vacant areas in 1992, but it should be understood that some of the land designated as residential and industrial will not be developed during the forecasting period.

The entire area west of the proposed Ideal Basic Industries site and south of Island Road (Hamilton Road) is mapped as industrial land in 1992. Industrial establishments are also projected to occupy most of the ship channel frontage east of the turning basin and a portion of the Mobile Bay waterfront just north of the Alabama State Docks terminal facility. Some commercial development is expected to occur on the north side of Island Road near the intersection with Rangeline Road, which would include convenience-type stores, eating and drinking

Table B.P.S.30. Projected Land Use in South Mobile County

Land Use in Acres	1975	2000	Increase, 1975 to 2000 Number	Increase, 1975 to 2000 Percent
Single-Family Residential	7,248	13,659	6,411	88%
Multi-Family Residential	32	93	61	191%
Trade:				
Wholesale	110	181	71	65%
Retail	712	1,506	794	112%
Services	22	215	193	877%
Industrial	1,124	2,640	1,516	135%

Source: SARPC, 1977.

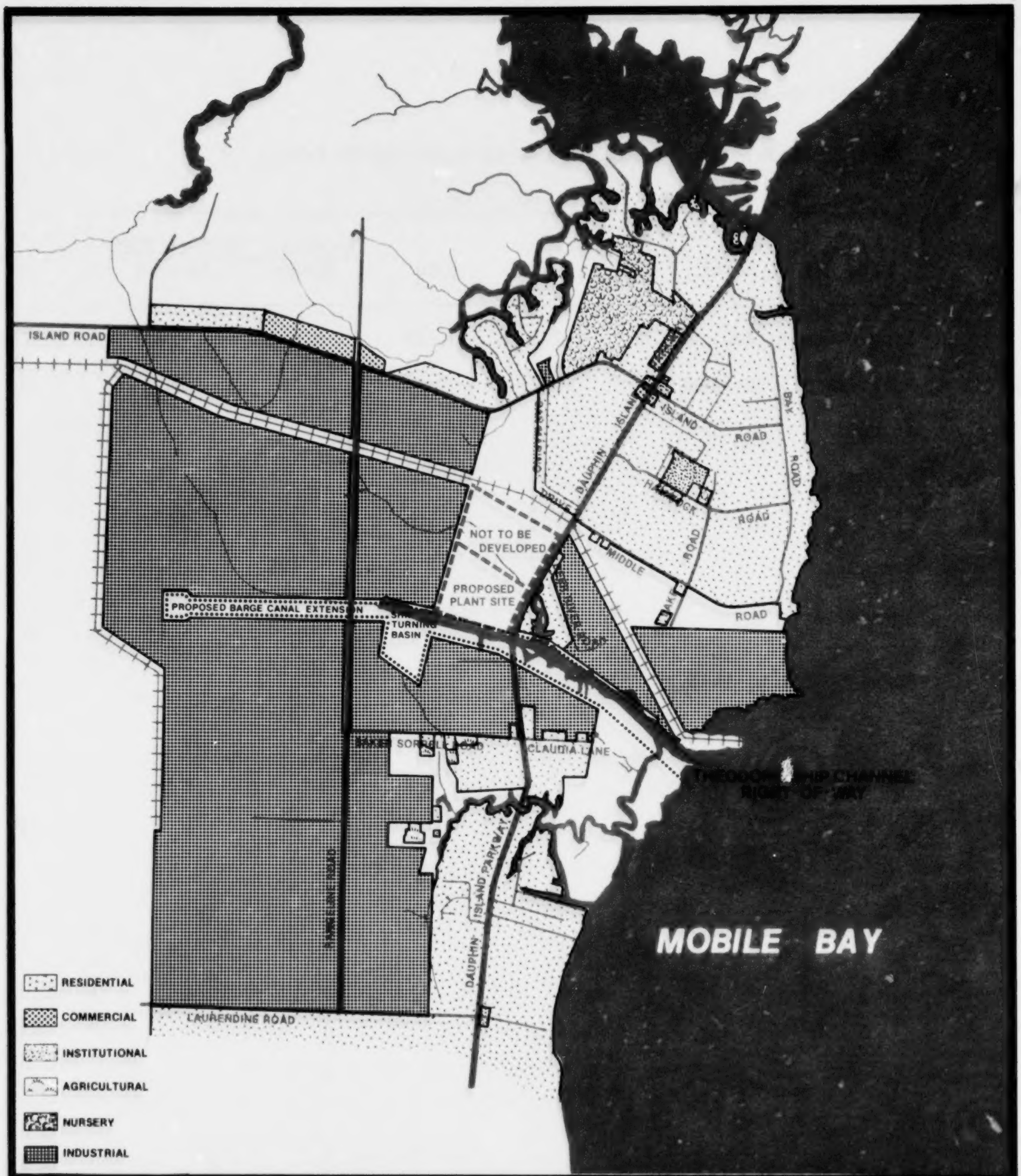

ISLAND ROAD
NOT TO BE DEVELOPED
PROPOSED PLANT SITE
PROPOSED BARGE CANAL EXTENSION
SHIP TURNING BASIN
DAUPHIN ISLAND
ISLAND
ROAD
HAMMOCK
ROAD
MIDDLE
ROAD
LAKE
ROAD
BAY ROAD
BAKER SORRELL ROAD
CLAUDIA LANE
THEODORE SHIP CHANNEL RIGHT-OF-WAY
DAUPHIN ISLAND PARKWAY
RANGELINE ROAD
LAURENDINE ROAD
MOBILE BAY
RESIDENTIAL
COMMERCIAL
INSTITUTIONAL
AGRICULTURAL
NURSERY
INDUSTRIAL

Figure B.P.S.3
PROJECTED LAND USE IN THE VICINITY OF THE PROPOSED IDEAL BASIC INDUSTRIES PLANT SITE, 1992

0 0.5 1
SCALE IN KILOMETERS

SOURCE. Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED CEMENT MANUFACTURING
PLANT THEODORE INDUSTRIAL PARK
MOBILE, ALABAMA

places, and perhaps some specialty retail establishments. Residential land uses could also occupy the Island Road frontage, although a major determinant will be whether or not the large tracts of land to the north are opened to large-scale development.

The area northeast of Alligator Bayou, San Marino Drive, and Middle Road is expected to be almost entirely residential in 1992, except for the land occupied by nurseries and a few commercial and institutional establishments. Some of the Island Road and Dauphin Island Parkway frontage would possibly be utilized for high-density residential development. Although this community will support convenience-type establishments such as a new grocery and drug store, commercial land uses will probably remain minor. Below Deer River, the ship channel project and new industrial development will displace most residential land uses as far south as Baker Sorrell Road and Claudia Lane. Residential land uses should predominate to the south of Claudia Lane. As in the case of the Hollinger Island community, new single-family dwellings will tend to be constructed a few at a time and will generally be priced within the means of higher-paid industrial workers.

It is apparent from inspection of the present and future land use maps that some land use conflicts exist in the vicinity of the proposed Ideal Basic Industries facility. These conflicts involve proximity of residential land to the Theodore Ship Channel and to areas where industrial development is likely to occur. The residential parcels in question are located on San Marino Drive, Middle Road, Deer River Road, Claudia Lane, the south bank of Deer River, and adjacent portions of the Dauphin Island Parkway. As is discussed below on a case-by-case basis, moderate land use conflicts will exist whether or not the proposed Ideal Basic Industries facility is built. At least some responsibility for this situation rests with the lack of zoning in Mobile County. It has been apparent for a decade that the Deer River area would ultimately become industrial in character, but there has been no mechanism whereby nearby land uses could be guided to conform with this fact. Fortunately, the number of dwellings involved is relatively small, as established by the dwelling unit count.

The present discussion assumes that the Theodore Ship Channel will be built concurrently with the Ideal construction project. Roughly, 12 to 15 dwelling units, located on both sites of the present barge canal, will be taken as part of the ship channel project. In addition, two small boatyards will be displaced. For the remaining residential properties within a few hundred yards of the canal, the character of the area as a place to live will be altered substantially by the dredging of the ship channel and by the greatly increased volume of waterborne traffic which will follow. The value of the river/canal for recreation will be reduced significantly.

South Bank Area

A short road extending west from the Parkway provides access to a number of properties (known as the "Richard Tipp Subdivision") which will be affected greatly by land takings for the ship channel. The land use forecasts assume that virtually all properties between Baker Sorrell Road and the ship channel will be converted to industrial use, along with most of the dwellings on the east frontage of the Parkway. The dwellings remaining in this area will be primarily those on the north frontage of Claudia Lane.

North Bank Area

The triangular area between the canal, the terminal railway, and the Dauphin Island Parkway contains 18 occupied dwellings, of which 13 front on the south side of Deer River Road. All of these dwellings except the three northernmost houses on the parkway have water access. Six of these properties will be affected very significantly by land takings for the ship channel project, and roughly 12 are likely to be vacated over the next 10 years. Some of these are high-value properties that may be difficult to convert to industrial or commercial use, and therefore may lose value as a consequence.

Middle Road

There are about ten dwelling units on Middle Road, all west of Lake Road, and two additional units at the south dead-end of Lake Road. Industrial development on the Mobile Bay waterfront east of the State Docks terminal could impact these units significantly, although the degree of impact will depend upon whether an access route other than Middle Road is constructed. The land use forecasts assume that these parcels will stay in residential use, with the possible exception of the two units on Lake Road, but that the presently-vacant properties fronting on the south side of Middle Road will remain idle as a buffer between the industrial and residential areas.

San Marino Drive

There are about sixty dwelling units on San Marino Drive between Island Road (Hamilton Road) and the Parkway. These are almost the only residential properties in the Industrial Park area that are more susceptible to impact by the proposed Ideal Basic Industries project than by the ship channel and other potential industrial development. The following three circumstances relate to these properties:

1. The San Marine Drive properties are located between .8 and 1.6 kilometers (one-half and one mile away) from the Ideal Basic Industries plant site. The intervening area consists of woodland and the State Docks terminal railway.
2. The value range of these properties and their favorable access to Mobile and the Industrial Park suggest that they could be marketed successfully by any residents desiring to move.
3. There is a high probability that the property now controlled by Ideal Basic Industries (because of its high value for a variety of industrial operations) will be in industrial use by 1992, whether or not the cement manufacturing facility is constructed as proposed.

The no-project baseline forecast assumes that the advantages of the area near San Marino Drive for residential occupancy will remain sufficiently high to justify substantial new development.

PUBLIC SEWERAGE

The proposed Theodore-Fowl River wastewater treatment plant is planned as a 8.7 million liter (2.3 million gallon) per day facility which would be constructed between 1980 and 1983. The site would be located on Rangeline Road in the Industrial Park. Treated effluent from this plant would be disposed in Mobile Bay by an outfall pipe which could also be utilized for disposal of industrial waste and stormwater runoff. (Plans for this "common outfall" are currently under review.) A "Section 201" study has been in preparation for the Theodore-Fowl River facility, as required for federal funding, but the final report is not available at the present time. SARPC has published estimates of the population to be served by this facility, which amounts to approximately 15,300 persons in 1983 and 38,600 persons in the year 2000.

Table B.P.S.31 presents rough estimates of the populations served by public sewer facilities in the three Census Divisions from 1970 to the year 2000, based on data from the Census and SARPC. The SARPC forecasts for treatment facility catchment areas have been allocated to Census Divisions and adjusted to conform to the overall population projections utilized here. The increases in sewered population due to service-area expansions between 1983 and 2000 have been assumed here to occur gradually rather than abruptly. These forecasts indicate that about half the South Mobile County population will be served by public sewerage in 1992, and about two-thirds in the year 2000. In the Theodore Division, public sewerage will be utilized by roughly half of all persons in 1985, two-thirds in 1992, and 90 percent in the year 2000. However, no more than about one-fourth of the population in the Grand Bay Division will be connected to public sewers throughout the planning period.

The extent to which a lack of public sewerage can inhibit land development in an area is dependent upon: (1) the types of land use demanded; (2) the suitability of soils for on-site septic systems; and

Table B.P.S.31. Estimates of Population Served by Public Sanitary Sewer Facilities in South Mobile County

	1970	1975	1985	1992	2000
Bayou La Batre Division					
Sewered	350	1,600	4,000	5,500	7,000
Unsewered	7,416	6,787	5,840	5,260	4,390
Percent sewered	5%	19%	41%	51%	61%
Grand Bay Division					
Sewered	0	0	1,000	3,000	5,000
Unsewered	9,685	13,049	15,760	16,150	15,750
Percent sewered	0%	0%	6%	16%	24%
Theodore Division					
Sewered	800	2,350	15,000	24,000	35,000
Unsewered	16,673	20,890	15,700	11,490	3,710
Percent sewered	5%	10%	49%	67%	90%
Total, South Mobile County					
Sewered	1,150	3,950	20,000	32,500	47,000
Unsewered	33,774	40,726	37,300	32,900	23,850
Percent sewered	3%	9%	35%	50%	66%

Source: Environmental Science and Engineering, Inc., (1977), based on SARPC, 1977.

(3) the stringency of regulations governing the installation of new septic systems. It appears that the lack of sewer facilities in most of South Mobile County has not had a major influence on land use patterns up to the present, partly because most developments would have consisted in any case of single-family housing at fairly low densities. The growth-directing influence of public sewerage may increase in the future, however, due to the expanding role of multi-family housing and mobile homes, and to the greater emphasis placed on water quality protection. Sewerage may be particularly critical to the future development of land along Bellingrath and Laurendine Roads.

HIGHWAY TRANSPORTATION

The substantial growth in population and employment forecasted for South Mobile County will create rapid increases in the usage of transportation facilities. Table B.P.S.32 presents a comparison of future traffic flows near Theodore Industrial Park with existing conditions. The first column lists the 1976 traffic counts available from the Alabama Department of Highways, with ranges indicated in cases where the counts varied significantly within a given highway segment. The figures in parentheses are the one-day counts taken by the County Highway Department in the summer of 1977, and thus must be regarded as approximate. The second column presents SARPC forecasts of average daily traffic counts in 1995, which are under revision at the present writing. Since SARPC planners currently feel that these projections are generally about 10 to 15 percent too high, the third column presents a somewhat scaled-down forecast series. The only projection which has been lowered by more than about 12 percent is the figure for Interstate 10, west of U.S. 90, which was indicated by SARPC to be a substantial overestimate.

Comparison of the forecasts in column three of the table with the data in column one indicates that, although traffic flows will increase rapidly overall, the highway system as originally proposed would provide a large measure of relief for Island Road (Hamilton Road) and the Dauphin Island Parkway. Increases in usage of the Parkway north of Island Road, and Island Road east of Rangeline Road, would be moderated by the fact that much of the traffic utilizing Rangeline as a detour over Deer River could continue north on the new Rangeline Expressway, rather than returning to the Dauphin Island Parkway via Island Road. Flows on Island Road west of Rangeline would be influenced by the fact that the Rangeline Expressway would provide a better route to Interstate 10 for trips originating or ending in the Theodore Industrial Park area. The Rangeline Expressway would therefore keep traffic flows on both sections of Island Road roughly near the present levels. The point of greatest stress in the system as proposed would be farther north, on

Table B.P.S.32. Traffic Forecasts for Highways Near the Theodore Industrial Area

	1976	1995, With Eslava Creek Freeway: Recent Estimates	1995, With Eslava Creek Freeway: Revised Estimates	1995, Without Eslava Creek Freeway
Dauphin Island Parkway:				
Island Road to Dog River	4,000 - 7,000	12,000	10,500	18,500
Dog River to I-10	11,000 - 23,000	18,000 - 20,000	17,000	28,000
Eslava Creek Freeway:				
Rangeline Expressway to Dog River	0	35,000	31,000	0
Dog River to I-10	0	40,000	35,000	0
Todd Road/Boulevard:				
Island Road to Rangeline Expressway	<1,000	10,500	9,000	<3,000
Rangeline Road:				
Expressway, Island Road to I-10	0	36,800	33,000	48,000
Laurendine Road to Island Road	(15,000)	28,000	25,000	25,000
U.S. Route 90:				
South of Bellingrath Road	4,000	9,000	8,000	8,000
Island Road to Mobile	17,000 - 21,000	28,000	25,000	25,000
Interstate 10:				
West of U.S. 90	17,000	40,000	30,000	30,000
U.S. 90 to Rangeline Expressway	---	50,000	44,000	44,000
Rangeline Expressway to I-65	26,000	70,000	62,000	77,000
Island Road:*				
U.S. 90 to Rangeline Road	(13,000)	16,500	15,000	15,000
Rangeline Road to Dauphin Island Parkway	(15,000)	16,500	15,000	23,000

* Island Road is also known as Hamilton Road.

Sources: Alabama Department of Highways, 1977.
Environmental Science and Engineering, Inc., 1977.
Mobile County Highway Department, 1977.
SARPC, 1977.

Interstate 10 between Rangeline Expressway and I-65, where the traffic count would increase from an average of 26,000 at present to approximately 62,000.

However, the figures in the third column of Table B.P.S.32 assume the presence of the Eslava Creek Freeway, which now appears unlikely to occur before 1995, if ever. The last column of the table presents traffic forecasts without the Eslava Creek Freeway. Of the projected Freeway traffic count of 31,000 vehicles at Dog River, 23,000 are assigned to the two alternate pathways to Mobile: Interstate 10 (15,000 vehicles) and the Island Road/Dauphin Island Parkway link (8,000 vehicles). In addition, 3,000 of the 4,000 additional vehicles which would be acquired by the Eslava Creek Freeway north of Dog River are assigned to the northern section of the Dauphin Island Parkway. One outcome of this adjustment is the finding that traffic on the Dauphin Island Parkway would roughly triple between 1976 and 1995 in the segment below Dog River, and would at least double in the section between Dog River and Brookley. Traffic on Island Road east of Rangeline would increase by at least 50 percent rather than holding fairly constant. The load carried by Rangeline Expressway would be about 50 percent higher than without the Eslava Creek Freeway, creating potentially serious problems at the intersection with Interstate 10. Finally, the traffic flow on Interstate 10 north of Rangeline Expressway would be three times its 1976 level. The projected 1995 volume of 77,000 vehicles per day would amount to a 24-hour average of nearly one vehicle per second. It would exceed by more than 50 percent the present traffic volume on any highway segment in the Mobile area, including the sections of Interstate 65 and Interstate 10 in Mobile that are most noted for congestion. The figures in the table are calculated with the assumption that without the Eslava Creek Freeway, the construction of Todd Boulevard will not occur (to replace the present unpaved and light-duty roadways), but this assumption does not affect the other figures.

These projected traffic volumes are, of course, rough estimates which are subject to variation depending upon future land development patterns and other factors affecting trip generation. A particularly important factor in the Industrial Park area is the possibility of significant commercial development, and perhaps high-density residential development, on the north side of Island Road, which could raise traffic volumes substantially above the future levels indicated here. Another critical factor is the extent to which large-scale residential development occurs south of Laurendine Road and in the lower Dauphin Island Parkway corridor. Based on existing information, it appears very important that Island Road be widened to at least three lanes all the way from U.S. 90 to the Dauphin Island Parkway. The Rangeline Expressway, when opened to traffic in approximately 1982, will initially intersect Island Road at a grade crossing. However, a separated cloverleaf will later be provided along with the four-laning of Rangeline Road through the Industrial Park.

The proposed extension of Rangeline Road south of Laurendine Road, to join the Dauphin Island Parkway near Fowl River, does not appear likely before 1990. The SARPC traffic forecasts for 1995 have indicated a daily volume of 12,500 vehicles on this link, which would imply a great deal of new development in the area since the current volume carried by the Parkway between Fowl River and Laurendine Road is only 2,500 to 3,000 vehicles. Regardless of when the extension is constructed, the current completion of Rangeline Road to Laurendine Road is an important step in that it provides an alternative to Baker Sorrell Road and shortens the overall length of the parkway detour by about 0.32 kilometer (0.2 mile) for trips originating south of Laurendine Road. There appears to be a good probability that, unless a number of high traffic-generating developments occur along Laurendine Road, traffic congestion will not be a serious problem in the district between the Industrial Park and Fowl River before 1992.

FUTURE EDUCATIONAL FACILITIES

Because of the increase in total population, public school enrollment in South Mobile County will rise substantially during the planning period. Table B.P.S.33 presents enrollment estimates based on the population forecasts discussed earlier, and various other assumptions. The percentage of the population consisting of school-age persons has been estimated by utilizing the age-specific population forecasts for Mobile County developed in the SARPC Population and Economy Study (with some smoothing of trends and adjustment for special conditions in the South County area). The number of school-age persons is expected to increase from approximately 13,270 in 1977 to about 16,000 in 1992. In 1970, 8,635 of the 10,589 school-age persons residing in South Mobile County were enrolled in public elementary and secondary schools, according to the U.S. Census (which is corroborated by School Board statistics). Of the remainder, 925 attended private schools, and 1,029 were either attending college or were not enrolled in any school.

The estimates for 1977, shown in the second column of the table, are somewhat surprising in that the number of persons aged 6 through 18 who did not attend public school in the past academic year is found to be about double the corresponding quantity in 1970. Since it is unlikely that the proportion of persons seeking education is declining, the explanation would be either a sharp increase in the enrollment of South County residents in private schools or schools outside the area, or an overestimation of the school-age population (with the sum of these discrepancies equalling perhaps 1,500 to 1,700 persons). In any case, the estimates of public school enrollment in future years assume that the gap between this quantity and the number of school-age persons will not widen appreciably.

The 12,000 public school students forecasted for the academic year 1991-1992 would represent an increase of 27.4 percent over 1976-77. The annual rates of increase would be 1.8 percent between 1977 and 1985, and 1.4 percent after 1985, as opposed to a recent rate of roughly 1.0 percent per year. In addition, these estimates do not cover children

Table B.P.S.33. Projected Public School Enrollment in South Mobile County

	1970	1977	1985	1992
Total Population	34,924*	47,400	57,300	65,400
Population Aged 6 Through 18:				
Percent of Total Population	30.3%	28.0%	26.0%	24.5%
Number	10,589*	13,270	14,900	16,000
Enrolled in Public School, Grades 1 Through 12	8,635*	9,416†	10,900	12,000
Enrolled in Private School, Or Not in School	1,954	3,854	4,000	4,000

* From U.S. Bureau of the Census, 1972.
† From Mobile County School Board, 1977.

Source: Environmental Science and Engineering, Inc., 1977.

enrolled in the kindergarten program, which is not funded at the present time but which is included in school board plans. Kindergarten students would number between 500 and 1,000 in 1991-1992.

A proposed means of dealing with the increased enrollments and upgrading the facilities available would be to construct three new high schools in South Mobile County. The three existing high schools would become middle schools, to supplement the presently overloaded St. Elmo facility; and all sixth-grade students would be shifted to these schools in order to relieve overcrowding at the elementary level. This approach was endorsed in 1976 by the Regional Development Plan, and is under review by the Board at the present writing. One of the new high schools would be located in Theodore, one would be roughly midway between Grand Bay and Bayou La Batre, and one would be somewhere near St. Elmo. The second (to be called South Mobile County High School) is needed to replace the existing Alba and Mobile County high schools, whereas the facility near St. Elmo would be designed to service the overflow from Theodore and the expected population growth in the central portion of the I-10 corridor. Building plans would also include two new elementary schools in the northern and central portions of the planning area, and expansion of two existing elementary schools.

This plan has been based upon estimates of 1981-82 school enrollments. However, since very rapid increases in enrollment were assumed (averaging 6.4 percent per year, plus the addition of kindergarten students), the proposed facilities would probably eliminate overcrowding through at least 1992. The manner in which students might be allocated to schools in the latter year is suggested in Table B.P.S.34. The figures include a total of 760 kindergarten students. Students in special education programs are allocated to class brackets rather than considered separately. (Relative to the proposals under review by the school board, the present figures assume greater utilization of the potential capacity at Mobile County and Theodore middle schools.) Table B.P.S.34 indicates that if all of the proposed facilities are constructed, each facility could be operating in 1991-92 at a level comfortably below its structural capacity.

Table B.P.S.34. Projected Utilization of School Facilities in 1991-1992

	Capacity		1976-77 Enrollment		Projected 1991-1992 Enrollment			
	Present*	Ultimate†	Grades	Number	K-5	6-8	9-12	Total
Existing Schools								
Alba	1,830	1,255	1-12	1,415	650	500	---	1,150
Dixon, Grand Bay	1,148	1,522	1-6	1,315	1,350	---	---	1,350
Davis, Burroughs, Griggs, Hollinger	2,436	2,336	1-6	2,594	2,100	---	---	2,100
Mobile County	1,200	1,200	7-12	1,047	---	1,000	---	1,000
St. Elmo	644	625	7-8	1,035	---	600	---	600
Theodore	2,156	1,500	9-12	1,689	---	1,300	---	1,300
Dauphin Island	84	60	1-6	50	60	---	---	60
New Schools								
South Mobile County	---	1,500	---	---	---	---	1,300	1,300
St. Elmo High	---	1,500	---	---	---	---	1,200	1,200
Theodore	---	1,500	---	---	---	---	1,300	1,300
Meadow Lake, St. Elmo Elementary	---	1,580	---	---	1,400	---	---	1,400
TOTAL	9,498	14,578			5,560	3,400	3,800	12,760

* From Development Management Plan, page 51.

† From School Board data on proposed teaching stations; capacities are modified for the Mobile County and Theodore Middle Schools.

Source: Environmental Science and Engineering, Inc., 1977.

The proposed school facility plan would have significant land use implications. The important characteristic is that no new construction would take place east of a line passing through Theodore, Dixon Corner, and Bayou La Batre. Therefore, virtually all of the Bellingrath Road and Dauphin Island Parkway corridors south of Laurendine Road would remain more than 8 highway kilometers (5 miles) away from the nearest school, with some areas more than 16 kilometers (10 miles) away. This factor, particularly the lack of an elementary school, could act to inhibit new residential development in the eastern portion of the region.

Given that only the Theodore High School has a high probability of being constructed in the next several years, it is worthwhile to examine future conditions when assuming just the presence of this facility. Table B.P.S.35 presents a possible allocation of students in the 1980-81 school year. If kindergarten enrollment is not included, the forecasts indicate that the present overloads could be virtually eliminated. The new facility at Theodore would not accommodate all high school students living in the northern portion of the region. Since it would presumably not be feasible to shift the excess to Mobile County or Alba (due to limited capacity in the former case and distance in the latter), these 400 high school students would have to remain at the old Theodore facility. The overcrowding of elementary schools could still be alleviated by shifting all sixth-grade students, other than those at Alba, to the middle schools at St. Elmo and Theodore. However, due to the low capacity at St. Elmo, more than half of the seventh- and eighth-grade students attending St. Elmo under present arrangements would have to be shifted to Theodore. The old Theodore facility would thus contain about 600 sixth-graders, approximately 400 students in each of the seventh and eighth grades, and about 100 students in each of the high school grades.

The arrangement of students shown in the table is only illustrative, but serves to show that construction of the Theodore High School will place slightly less than half of the region's high-school students in a modern, adequate facility. It will just eliminate overcrowding through

Table B.P.S.35. Possible Allocation of Public School Students After Construction of Theodore High School

Schools	Capacity	Projected 1980-81 Enrollment			
		1-5	6-8	9-12	Total
Alba	1,830	480	430	560	1,470
Dixon, Grand Bay	1,148	1,170	---	---	1,170
Davis, Burroughs, Griggs, Hollinger	2,436	2,320	---	---	2,320
Mobile County	1,200	---	450	760	1,210
St. Elmo	644	---	690	---	690
Theodore (old)	2,156	---	1,340	400	1,740
Theodore (new)	1,500	---	---	1,500	1,500
Dauphin Island	84	50	---	---	50
TOTAL	10,998	4,020	2,910	3,220	10,150

Source: Environmental Science and Engineering, Inc., 1977.

1980-81, but only if kindergarten is not provided. Overutilization of capacity will clearly become a problem unless some of the other proposed facilities are constructed.

APPENDIX B. BASELINE

SOCIOECONOMICS

QUARRY SITE

EXISTING ENVIRONMENT (1977)

Population and Economy

The socioeconomic impact area of the proposed quarrying operation is designated as Monroe, Clarke, and Conecuh counties. Primary attention is paid to Monroe County, since the relatively small scale of the project in terms of ongoing local expenditures makes it highly unlikely that significant socioeconomic impacts will occur over a wide area. The region centered around Monroe County has historically been characterized by declining populations and generally stagnant economic conditions. Table B.Q.S.1 lists the number of inhabitants in each county in the years 1940, 1950, 1960, and 1970. All three counties lost population during the 1940 to 1970 period, but at widely different rates. The overall declines amounted to 3.3 percent for Clarke County, 29.3 percent for Monroe County, and 38.6 percent for Conecuh County. The rates of decline were substantially lower in the 1960-1970 interval than in earlier decades, with Clarke County showing a modest 3.4 percent gain during this period.

The different rates of population change shown in Table B.Q.S.1 can be attributed to geographical accident as well as to differences in economic performance. Throughout southwest Alabama, most population losses have involved black inhabitants, particularly the black farm population. The regional decline in the latter population category from 1940 to 1970 exceeded 90 percent. Historically, Clarke County has had a small agricultural sector relative to Monroe and Conecuh counties. Therefore, the abandonment of marginal family farms has had much less impact on population in Clarke County than in many other areas. Also, Clarke County contains two major urban centers (Thomasville and Jackson, near the county's northern and southern borders), whereas Monroe and Conecuh counties each contain only one. Such urban centers have tended to be the primary locus of economic growth in southwest Alabama.

Table B.Q.S.1. Historical Population Trends in the Quarry Impact Area

	Monroe County	Clarke County	Conecuh County
Population			
1940	29,465	27,636	25,489
1950	25,732	26,548	21,776
1960	22,372	25,738	17,762
1970	20,883	26,724	15,645
1975	21,200	27,000	15,300
Rate of Population Change			
1940-1950	-12.7%	-3.9%	-14.6%
1950-1960	-13.0%	-3.1%	-18.4%
1960-1970	- 6.7%	3.8%	-11.9%
1970-1975	1.5%	1.0%	- 2.2%

Sources: U.S. Bureau of the Census, 1971; 1975.

Over and above these differences, the three counties in the impact area are notably similar in terms of economic structure. Table B.Q.S.2 presents for each county the industry group of employed residents in 1970. Manufacturing accounts for more than 40 percent of resident employment in each case, and has superseded agriculture as the primary economic base. Two-thirds or more of manufacturing activity in each case is concentrated in two industry categories: wood products and textile products. The former category includes furniture as well as lumber and other construction materials containing wood. This manufacturing activity has evolved naturally in response to the presence of large timber stands and ongoing forestry activity. Apparel and other textile products manufacturing has been attracted to the area, as elsewhere in the southeast United States, largely by the low prevailing wage rates and other labor market factors. The other manufacturing activities in the impact area include a major pulp and paper mill in Clarke County, which is obviously forest-related, and establishments in Monroe and Conecuh counties that produce motor vehicle equipment.

Employment in the tertiary sector (services-producing activity) is generally limited to the amounts necessary to fulfill service demands generated in each urban area and its immediate hinterland. Wholesale and retail trade employment, of which wholesale trade is only a small part, accounts for 17.9 percent of total resident employment in Clarke County, 14.3 percent of employment in Monroe County, and 12.9 percent of employment in Conecuh County. This pattern reflects the relative dominance of urban centers in the three counties and is repeated in several other key service categories. However, Monroe and Conecuh counties have larger shares of employment in public education than does Clarke County. In the case of Monroe County, this reflects the presence of Patrick Henry State Junior College and Monroe Academy. A major telephone facility is also located in Monroe County.

Tables B.Q.S.3 and B.Q.S.4 present additional data describing employment conditions in the impact area. As indicated by Table B.Q.S.3, the ratio

Table B.Q.S.2. Industry Group of Employed Residents in 1970; Counties in Quarry Impact Area

	Monroe County	Clarke County	Conecuh County
Agriculture, forestry, and fisheries	564	125	423
Mining	10	98	21
Construction	608	639	338
Manufacturing:			
Furniture and wood products	772	1,698	538
Textiles and textile products	1,414	759	759
Other manufacturing	569	1,043	645
(Total)	(2,755)	(3,500)	(1,942)
Transportation, communications, utilities	360	406	238
Wholesale and retail trade	984	1,493	630
Finance, insurance, real estate	115	266	57
Personal services	436	590	373
Education and health services	623	678	496
Other services	229	328	144
Public administration	216	226	207
TOTAL EMPLOYED RESIDENTS, 16 YEARS OLD AND OVER	6,900	8,349	4,869

Source: U.S. Bureau of the Census, 1972.

Table B.Q.S.3. Labor Force Characteristics of Counties in the Quarry Impact Area

	Resident Population, 1970			
	Total	In Civilian Labor Force*	Employed*	Employment/ Population Ratio
Monroe County	20,883	7,188	6,900	0.330
Clarke County	26,724	8,624	8,349	0.312
Conecuh County	15,645	5,287	4,869	0.311
State of Alabama	3,444,165	1,249,195	1,193,315	0.347

* Excludes workers 14 and 15 years old, and armed forces personnel.

Source: U.S. Bureau of the Census, 1972.

Table B.Q.S.4. Unemployment Trends in the Quarry Impact Area

	Percent of Civilian Work Force Unemployed		
	1970	1973	1974
Monroe County	5.7	5.8	6.6
Clarke County	6.7	4.7	7.0
Conecuh County	6.8	4.7	5.9
State of Alabama	5.9	4.5	5.5

Source: Alabama Department of Industrial Relations, Research and Statistics Division, 1976.

of employment to population in 1970 was somewhat higher in Monroe County than in Clarke and Conecuh counties, but was lower in all three cases than the corresponding ratio for the State of Alabama as a whole. Unemployment rates, shown in Table B.Q.S.4, have been consistently somewhat higher in the three impact area counties than in the state as a whole, with the exception of Monroe County during 1970. The unemployment rates of all three counties rose above 9 percent during the recession of 1975, but have since tended to approach their former levels. Although gross unemployment rates and employment/population ratios are imperfect as indicators of labor market conditions, the three-county impact region can accurately be described as a labor surplus area during at least the first half of the current decade.

Table B.Q.S.5 indicates the commuting patterns which prevailed in the three counties in 1970. A total of 300 persons traveled from residences in Conecuh County to work in Monroe County (first column of the table). This accounted for over half of the in-commuting to Monroe County, but was only equal to about 5 percent of total Monroe County employment. The out-commuters from Monroe County traveled primarily to Wilcox, Clarke, Conecuh, and Mobile counties, in decreasing order of importance. Clarke County received significant numbers of in-commuters from Washington, Marengo, and Wilcox counties, whereas many Clarke County residents worked in Wilcox and Washington counties. In the case of Conecuh County, out-commuters far outnumbered in-commuters, with the largest numbers of out-commuters working in Escambia and Monroe counties. In general, these figures are likely to underestimate true commuting somewhat, due to under-reporting in the census; however, they provide a good indication of overall work-trip patterns.

Income levels in the impact area are relatively low. Table B.Q.S.6 presents per capita income data for the three counties and the State of Alabama in 1965, 1970, and 1973. Per capita income was estimated to be lowest in Conecuh County and highest in Monroe County; but all three counties compared unfavorably with the State of Alabama, which was in turn low relative to the United States. During the 1965 to 1973

Table B.Q.S.5. Commuting Patterns in the Quarry Impact Area, 1970

Origin (Place of Residence)	Destination (Place of Work) Monroe County	Clarke County	Conecuh County	Elsewhere
Monroe County		81	129	327
Clarke County	29		---	979
Conecuh County	300	8		697
Elsewhere	205	1,093	207	

Source: Associated Water and Air Resources Engineers, Inc., 1975.

Table B.Q.S.6. Income Trends in the Quarry Impact Area

	Estimated Per Capita Income, In Current Dollars				
				Change, 1965--1973	
	1965	1970	1973	Dollars	Percent
Monroe County	1,443	2,251	3,126	1,683	116.6
Clarke County	1,438	2,157	2,844	1,406	97.8
Conecuh County	1,164	1,974	2,796	1,632	140.2
State of Alabama	1,984	2,947	3,864	1,880	94.8

Source: Alabama Development Office, 1976.

interval, the per capita incomes in all three counties increased at higher percentage rates than the state, but were exceeded by the state in terms of absolute dollar increment. Table B.Q.S.7 describes the income and poverty status of families and "unrelated individuals" according to the 1970 Census. Roughly one-third of all families in each county had incomes below the poverty level, as opposed to one-fifth of all families in the State of Alabama. According to this source, income levels were somewhat higher in Clarke County than in Monroe County. However, by 1975, the median family income in Monroe County had risen from $5,442 to $6,719 in constant dollars, an increase of 23 percent (Snowden, 1977).

Tables B.Q.S.8 through B.Q.S.12 provide a somewhat more detailed and up-to-date description of population and employment trends in Monroe County. Table B.Q.S.8 attempts to identify the important elements of change which underlie the apparent stability of population in Monroe County over the past ten years. The first column pertains to total population in 1960, 1970, and 1975, as reported by the U.S. Census Bureau. The net population change between any two years can be considered as the sum of two components: natural increase (i.e., births minus deaths within the county) and net migration. The latter figure is usually obtained by subtraction. In Monroe County between 1960 and 1970, a natural increase of 3,316 persons was more than offset by a net out-migration of 4,805 inhabitants, yielding a loss of 1,489 persons. Between 1970 and 1975, natural increase proceeded at a somewhat lower annual rate than before; but net out-migration was much lower (157 persons per year, as opposed to 480 persons per year prior to 1970). Thus there was a very modest increase in total Monroe County population during the 1970 to 1975 period.

The second and third columns of Table B.Q.S.8 present similar data for the black ("nonwhite") and white components of the Monroe County population, utilizing several reasonable assumptions to estimate quantities that are unavailable from existing sources. The upper portion of the table shows that, if the rates of natural increase for the white and black population components during 1960-1970 are assumed to be the same, Table B.Q.S.7. Income in 1969 of 1970 Residents; Quarry Impact Area and State of Alabama

	Families		Unrelated Individuals	
	Median Income	Percent Below Poverty Level	Median Income	Percent Below Poverty Level
Monroe County	$5,442	34.3	$1,152	69.9
Clarke County	$5,900	29.8	$1,365	67.3
Conecuh County	$4,729	35.5	$1,414	67.0
State of Alabama	$7,266	20.7	$1,618	55.3

Source: U.S. Bureau of the Census, 1972.

Table B.Q.S.8. Components of Recent Population Change, Monroe County

	Total	White (By Subtraction)	Black	Percent Black
Population, 1960	22,372*	11,030	11,342†	50.7
1960-1970 Change:				
Natural Increase	3,316	1,635***	1,681***	
Net Migration	-4,805**	-1,351	-3,454	
Net Change	-1,489	284	-1,773	
Population, 1970	20,883*	11,314	9,569†	45.8
1970-1975 Change:				
Natural Increase	1,100††	596***	504***	
Net Migration	- 783††	115†††	- 898***	
Net Change	317	711	- 394	
Population, 1975	21,200††	12,025	9,175	43.3
Annual Rate of Growth, 1970-1975	0.3%	1.2%	- 0.8%	

Sources:

* U.S. Bureau of the Census, 1971.
† U.S. Bureau of the Census, 1961; 1972.
** U.S. Bureau of the Census, 1971.
†† U.S. Bureau of the Census, 1976.
*** Estimated by assuming similar rates of natural increase for whites and nonwhites (i.e., similar ratios of natural increase to initial-year population).
††† ESE estimates; see note on following page.

NOTE TO TABLE B.Q.S.8

Preparation of migration estimates for the white and black components of the population has required consideration of gross as well as net population movements. Based upon the census tables describing where the 1970 residents of Monroe County lived in 1965, the amounts of gross migration into the county between 1960 and 1970 are estimated as shown in the first column of the following table. (Gross out-migration is then obtained by subtraction, since net migration is known.)

	1960-1970 Gross In-Migration	1960-1970 Gross Out-Migration	1960-1970 Net Migration
White	3,050	4,401	- 1,351
Black	750	4,204	- 3,454
Total	3,800	8,605	- 4,805

For the 1970 to 1975 interval, two assumptions are made: (1) The ratio of gross out-migration during 1970-1975 to gross out-migration during 1960-1970 was the same for both the black and white populations; and (2) The rate of gross in-migration, per year, was 20 percent higher during 1970-1975 than during 1960-1970 (due to increased economic opportunities), for both the white and black populations. The following estimates are then obtained for 1970 to 1975. These are the only possible figures which will satisfy the above assumptions while yielding a total net migration of -783 persons.

	1970-1975 Gross In-Migration	1970-1975 Gross Out-Migration	1970-1975 Net Migration
White	1,830	1,715	115
Black	450	1,348	- 898
Total	2,280	3,063	- 783

there was a net out-migration of roughly 3,450 blacks during this period, as opposed to only about 1,350 whites. Further assumptions about migration and natural increase during 1970-1975 (noted in the table) suggest that there was actually a modest net in-migration of whites during 1970-1975; whereas the net out-migration of blacks remained relatively high, at about 180 persons per year. The white population in 1975 is estimated to have been about 12,025 persons, implying a 1.2 percent annual rate of increase in this component since 1970. On the other hand, the black population probably declined at an annual rate of about 0.8 percent to approximately 9,175 persons in 1975. Other assumptions would yield an even greater rate of decline; for example, the black rate of natural increase could be assumed lower than the white rate, due to the relatively few young black adults present in the county as a result of past out-migration. Thus the reported stability of total Monroe County population during 1970-1975 actually masks several strong trends which have important implications for the future of the county.

Tables B.Q.S.9 and B.Q.S.10 describe labor force and employment characteristics of Monroe County residents in 1970, again pointing out significant differences between the black and white populations. The figures of greatest concern are contained in the bottom rows of Table B.Q.S.9 Approximately one-third of all Monroe County residents were employed, inside or outside the county, in 1970. However, 41.6 percent of the white population was employed, whereas only 22.8 percent of all black persons were working. The ratio of nonworkers to workers, often called the dependency ratio, was therefore over twice as high for blacks as for whites--3.38 versus 1.41. Some explanation for this situation is provided by Table B.Q.S.10. The second and third rows of this table indicate that persons under age 16, and persons over 16 who were enrolled in school, accounted for over half of the Monroe County black population in 1970, as opposed to less than a third of the white population. This difference was due to the heavy out-migration of young black adults during previous years and was the most important single

Table B.Q.S.9. Employment Characteristics by Race; Monroe County, 1970

	Total	White	Nonwhite
Total Population	20,883	11,386	9,497
Labor Force	7,188	4,862	2,326
Percent of Population	34.4%	42.7%	24.5%
Employed	6,900	4,734	2,166
Percent of Population	33.0%	41.6%	22.8%
Nonworker/Worker Ratio	2.03	1.41	3.38

Source: U.S. Bureau of the Census, 1972.

Table B.Q.S.10. Labor Force Composition by Race; Monroe County, 1970

	White		Nonwhite	
	Number	Percent of Total Pop.	Number	Percent of Total Pop.
Total Population	11,386	100.0	9,497	100.0
Under 16 years of age	3,186	28.0	4,124	43.4
Over 16, not in labor force:				
Enrolled in school	504	4.4	744	7.8
Over 65	1,095	9.6	860	9.1
Women with own children under 6	452	4.0	440	4.6
Other	1,287	11.3	1,003	10.6
Labor force (over 16)	4,862	42.7	2,326	24.5

Source: U.S. Bureau of the Census, 1972.

factor accounting for the high dependency ratio. It was true that a relatively high proportion of black adults between 16 and 65 who were not enrolled in school did not participate in the labor force; but this could represent the selective effects of out-migration (i.e., departure of the most productive and healthy persons) as well as the prevailing shortage of economic opportunities.

Table B.Q.S.11 presents a tabulation of 1970 resident employment in Monroe County by industry, sex, and race. Employment of white males was relatively concentrated in the trade/finance/transportation/utilities sector, accounting for 28 percent of the total, and in agriculture, construction, and manufacturing. Nearly one-third of the employed black males in Monroe County were engaged in lumber and wood products manufacture. In the case of white females, half of all resident employment was in manufacturing industries, the great bulk of this involving textile products. Nonwhite female employment was markedly different, with manufacturing activity accounting for only about one-fourth of all workers. Forty-four percent of all working nonwhite females were either engaged in domestic service or employed in providing cleaning or food services to businesses.

Table B.Q.S.12 describes recent employment trends in Monroe County using a somewhat different industrial classification. The upper portion of the table pertains to employment of Monroe County residents; the lower portion ("Wage and Salary Employment") applies to jobs within the county. Total resident employment increased by 520 persons, or 7 percent, between 1970 and 1977. However, the civilian labor force expanded by 8 percent during this period, so that the unemployment rate actually increased somewhat. Given the fact that population increased very little, at least through 1975, this situation can be considered to reflect the slack that existed in the labor market in 1970, which was not fully reflected in the unemployment rate. The employment growth between 1970 and 1977 was paced by an expansion in manufacturing jobs which amounted to an annual rate of 2.5 percent during both 1970-1974

Table B.Q.S.11. Resident Employment in Monroe County, 1970, by Industry, Sex, and Race

	Male		Female	
	White	Nonwhite	White	Nonwhite
Agriculture, forestry, fisheries	336	214*	9	5*
Construction and mining	386	212*	15	5*
Manufacturing:				
Wood products	323	432*	12	5*
Textile products	393	57*	784	180*
Other	361	92*	96	20*
Trade, finance, transportation, communications, utilities	831	194*	374	60*
Educational services	80	70*	182	143*
Private households; cleaning and food services †	51	61	67	355*
Other services	207	31	277	30*
	2,968	1,363	1,766	803

* ESE estimates, based upon published census tables.

† Obtained by summing private household workers and cleaning and food service workers from the Census occupational classification.

Sources: U.S. Bureau of the Census, 1972.
Environmental Science and Engineering, Inc., 1977.

Table B.Q.S.12. Recent Employment Trends in Monroe County

	1970	1974	April, 1977
Civilian labor force*	7,940	8,320	8,590
Employment*	7,490	7,770	8,010
Unemployment*	450	550	580
Unemployment rate*	5.7	6.6	6.8
Wage and Salary Employment			
Manufacturing†	2,740	3,030	3,250
Nonmanufacturing†	2,520	2,760	2,990
Construction	--	320	210
T. C. U.	--	200	210
Wholesale and Retail	--	720	970
Fire	--	90	130
Services	--	340	340
Government	--	1,060	1,090
Other	--	30	40

* By place of residence
† By place of work

Sources: State of Alabama Employment Service, 1970; 1975.
Alabama Department of Industrial Relations, Research and Statistics Division, 1976.

and 1974-1977. Contributing to the expansion were a new sawmill and a particle board plant which both opened in 1974.

The major employer in Monroe County is Vanity Fair Mills, Inc., in Monroeville. This firm employs approximately 2,000 persons, nearly 90 percent of whom are female. Thus, Vanity Fair has accounted for two-thirds or more of all manufacturing jobs in Monroe County until recently. In 1970, Vanity Fair employed more than 1,500 women, whereas the census reported less than 1,000 female Monroe County residents engaged in textile products manufacture. Therefore, at least one-third of this firm's employees were apparently commuters from outside the county. The number of jobs provided by Vanity Fair has remained relatively constant in recent years, although an expansion to provide between 250 and 300 new jobs was announced in mid-1976. As is discussed later, the major growth impetus for Monroe County during 1977-1980 is being provided by construction of the Parsons and Whittemore pulp mill, which will eventually employ about 350 persons, and the opening of new wood products plants at Beatrice and Peterman.

AGRICULTURE

Agriculture represents a declining component of the Monroe County economy, but nevertheless remains significant. Summary statistics for agriculture in the years 1969 and 1974 are presented in Table B.Q.S.13. Total land in farms decreased from approximately 99,150 hectares (245,000 acres) in 1969 to about 68,800 hectares (170,000 acres) in 1974, a decline of over 30 percent. The 1974 figure represented only 25.7 percent of the total area of Monroe County. The total number of farms dropped by about 22 percent during this period, from 1,009 to 786. As shown by Table B.Q.S.13, the decline in farmland was due largely to a 43.3 percent decrease in the area of woodland, including woodland pasture, held as part of farmland. Cropland accounted for about 33,180 hectares (82,000 acres) in 1969, and 29,260 hectares (72,300 acres) in 1974, of which about 55 percent was harvested in each case. The large amount of cropland in 1969 which was neither harvested nor used for pasture is indicative of the poor conditions for agriculture prevailing in that year, which are also reflected in the financial statistics. The principal crops harvested in both years were corn, soybeans, and cotton, with an increasing proportion of acreage devoted to soybeans.

The lower portion of Table B.Q.S.13 deals only with "commercial" farms having current sales of $2,500 per year or more. The number of such farms in 1974 (429) closely coincides with the number of farm operators listing farming as their principal occupation (435). Commercial farms accounted for 96.5 percent of all farm products sales in 1974. The number of these farms increased modestly between 1969 and 1974, although the increase was due in part simply to reclassification of farms as a result of the generally rising value of farm products. The average value of products sold by commercial farms was $14,079 per farm in 1969 and $22,082 in 1974, the former figure being only a bit higher than the average of farm production expenses in that year. As shown by the bottom portion of Table B.Q.S.13, the 1969-1974 increase in sales by commercial farms was due entirely to a 161 percent increase in the value

Table B.Q.S.13. Characteristics of Agriculture in Monroe County

	1969	1974	Percent Change 1969-1974
All Farms			
Number of farms	408 (1,009)	318 (786)	-22.1
Land in farms - hectares*	99,157 (245,018)	68,739 (169,855)	-30.7
Average size of farm - hectares*	98 (243)	87 (216)	-11.1
Value of agricultural products sold ($1,000)	2,527 (6,243)	3,973 (9,817)	57.2
Cropland harvested - hectares*	18,301 (45,222)	16,182 (39,986)	-11.6
Corn - hectares*	5,424 (13,402)	4,174 (10,314)	-23.0
Soybeans - hectares*	4,677 (11,556)	5,837 (14,423)	24.8
Cotton - hectares*	4,771 (11,790)	4,401 (10,876)	- 7.8
Cropland used for pasture - hectares*	9,874 (24,399)	11,049 (27,303)	11.9
All other cropland - hectares*	5,034 (12,438)	1,219 (3,011)	-75.8
Woodland, including pasture - hectares*	54,045 (133,546)	30,618 (75,657)	-43.3
All other land - hectares*	11,903 (29,413)	9,671 (23,898)	-18.8
Farms With Sales of $2,500 and Over			
Number of farms	410	429	4.6
Land in farms - hectares*	78,223 (193,290)	59,054 (145,923)	-24.5
Average size of farm - hectares*	191 (471)	138 (340)	-27.8
Value of agricultural products sold ($1,000)	5,772	9,473	64.1
Average per farm (dollars)	14,079	22,082	56.8
Farm production expenses ($1,000)	5,181	6,583	27.1
Average per farm (dollars)	12,637	15,345	21.4
Value of crops sold ($1,000)	2,331	6,087	161.1
Value of forest products sold ($1,000)	563	484	-14.0
Value of livestock and poultry products sold ($1,000)	2,877	2,902	0.9

* Numbers in parentheses represent corresponding acreage value.

Source: U.S. Bureau of the Census, 1973; 1977.

of crops sold. Livestock and livestock product sales, consisting largely of cattle and hogs, remained nearly constant in dollar value; but the numbers of animals sold dropped sharply from 1969 to 1974.

HOUSING CHARACTERISTICS

Housing conditions in the three impact area counties generally reflect the economic and demographic circumstances discussed previously. Table B.Q.S.14, which summarizes various housing characteristics of Monroe, Clarke, and Conecuh counties in 1970, also illustrates some aspects of poverty in the region. The first few rows of Table B.Q.S.14 present the numbers of dwelling units by occupancy and vacancy status. In Monroe County, more than one-third of all occupied units in 1970 were renter-occupied, whereas renters accounted for only 27 percent of occupied units in both Clarke and Conecuh counties. The table points out in particular the number of vacant dwelling units and vacancy rates in the impact area relative to the State of Alabama as a whole. Although Clarke County was similar to the state in this regard, the overall vacancy rates of 11.1 percent and 9.7 percent for Monroe and Conecuh counties were well in excess of the Alabama rate of 7.2 percent and would generally be considered high by any standard of comparison. These rates must be interpreted carefully, however, since they reflect the presence of numerous dwellings in rural areas which had been abandoned by out-migrants before 1970, and which were in extremely poor structural condition.

In the State of Alabama as a whole, about 3.6 percent of all dwelling units in 1970 were vacant but not for sale or rent. Nearly half of these were either rented or sold, and were awaiting occupancy, or else were held for occasional use. However, vacant units which were neither for sale or rent amounted to 5.9 percent of all units in Monroe County, and 7.2 percent in Conecuh County. It is believed that many of these units were either marginal or uninhabitable and therefore did not effectively contribute to the supply of available housing. The high vacancy rate for rental housing suggests that many rental properties in the county also fit this description in 1970. The overall vacancy rates thus overestimate the degree of slack in the housing market. In any case, it is clear that very little slack in the market for sound housing units has existed since roughly 1974.

Table B.Q.S.14. Housing Characteristics of Counties in the Quarry Impact Area, 1970

	Monroe County	Clarke County	Conecuh County	State of Alabama
Year-round housing units	6,674	8,251	5,165	-----
Owner-occupied units	3,899	5,556	3,393	-----
Renter-occupied units	2,033	2,052	1,272	-----
Vacant units:				
Total	742	643	500	-----
Vacant for sale only	37	65	12	-----
Vacant for rent	313	220	117	-----
Other vacant	392	358	371	-----
Vacancy rates:				
Total	11.1%	7.8%	9.7%	7.2%
Ownership housing only	0.9%	1.2%	0.4%	1.2%
Rental housing only	13.3%	9.7%	8.4%	8.6%
Percent of year-round units having specified characteristics:				
Mobile home or trailer	5.0%	5.5%	3.6%	4.2%
In multi-unit structure	5.0%	4.1%	4.9%	12.4%
Public sewer	27.3%	33.2%	20.4%	50.8%
Community water supply	42.7%	50.2%	31.7%	69.6%
Built 1960-1970	27.6%	28.6%	21.1%	29.6%
Built before 1940	36.7%	31.3%	43.2%	30.6%
Lacking piped water	25.4%	22.6%	26.3%	8.7%
Lacking some plumbing facilities	37.8%	33.8%	41.1%	16.9%
Percent of occupied units:				
Without telephone	37.4%	33.5%	37.6%	21.8%
Without automobile	25.1%	26.3%	29.3%	18.6%
More than one person/room	16.5%	15.2%	14.1%	11.1%
Percent of owner-occupied units:				
Value less than $5,000	24.0%	26.4%	38.9%	12.9%
Lacking some plumbing facilities	22.6%	24.7%	34.7%	9.2%
Percent of renter-occupied units:				
Contract rent less than $30	48.5%	36.2%	41.3%	22.0%
Lacking some plumbing facilities	50.2%	43.4%	57.6%	20.0%

Source: U.S. Bureau of the Census, 1971.

The remainder of Table B.Q.S.14 compares the impact area counties with the State of Alabama in terms of the percentage of dwelling units having various characteristics. All three counties were considerably lower than the state in terms of dwelling units in multi-unit structures, and dwellings with public water and sewer. The housing stock in each county was also somewhat older than that of the state as a whole, although this difference was significant only in the case of Conecuh County. More notable was the fact that about one-fourth of all dwellings in the impact area did not have water piped indoors and that upwards of one-third lacked some or all plumbing facilities. The corresponding percentages for Alabama were 8.7 percent and 16.9 percent. In each of the three counties, more than one-third of all dwelling units lacked telephones, and more than one-fourth were without automobiles, as opposed to 21.8 percent and 18.6 percent of units, respectively, in Alabama as a whole. The prevalence of crowding, as measured by the proportion of dwellings with more than one occupant per room, was somewhat worse in the impact area than in the state. The bottom portion of Table B.Q.S.14 indicates that the impact area counties had much higher proportions of low-value and low-rental units than did Alabama. On the whole, the poor condition of much of the housing stock in each of the three counties could have been attributed directly to the low prevailing levels of income. Substantial improvement in housing conditions between 1970 and 1977 has been reported to have taken place.

Within Monroe County it is apparent that at least a moderate housing shortage has developed in recent years due to increases in employment. The only direct information covering the years since 1970 is contained in a recent study of Monroeville (discussed below); but the increased housing demand in the county as a whole can be estimated through a series of calculations such as those summarized in Table B.Q.S.15. Population and number of households are estimated for Monroe County in 1975 and 1977 on the basis of employment, using extrapolated values of two ratios noted in the table. As is discussed below, these figures (with the exception of population in 1975) represent potential values which possibly have not been achieved. With regard to the housing

Table B.Q.S.15. Potential Dwelling Unit Demand, Monroe County

	1970	1975	April, 1977 Potential
Wage and salary employment*	5,260	5,880	6,240
Population	20,883	21,200	21,685†
Population in households	20,801	21,118**	21,603**
Number of households	5,932	6,399††	6,647††
Housing stock:			
Units built before 1970	6,674	5,948***	5,707***
Less: vacant units	- 742	- 742†††	- 742†††
Occupied units built before 1970	5,932	5,206	4,965
New units required (cum.)	-----	1,193	1,682
Required annual construction rate (interval ending with the given year)	184	239	272

* By place of work; Alabama Employment Service.

† Estimate based on extrapolation of population/employment ratio.

** Estimates assume 82 persons in group quarters, as in 1970.

†† Based on geometric extrapolation of population/households ratio (observed values: 1960, 3.97; 1970, 3.51; estimated values: 1975, 3.30; 1977, 3.25).

*** Based on extrapolation of 1960-70 dwelling unit loss rate; see text.

††† Assumed constant.

Source: U.S. Bureau of the Census, 1971.

stock, the census indicates that: (1) the total number of dwellings increased by 588 units, from 6,086 to 6,674, between 1960 and 1970; (2) 1,839 of the units present in 1970 were constructed between 1960 and 1970. Thus, there was an apparent loss of 1,251 units (1,839 minus 588) from the housing stock due to abandonment and/or demolition, which amounts to an annual loss rate of 2.275 percent. Such a high loss rate would be due to the large proportion of substandard housing present in the county and could be expected to continue past 1970. When this loss rate is applied to the 1970 housing stock, it is estimated that 5,498 of the units built before 1970 were still present in 1975, and that 5,707 of these remained in 1977. The number of vacant dwellings, consisting largely of substandard units, is assumed to have held constant after 1970, even though vacant units increased by 59 percent during the previous decade. The difference between the number of remaining units built before 1970 (less vacant units) and the estimated number of households represents the demand for residential construction after 1970. These figures for 1975 and 1977 are presented in the next-to-last row of Table B.Q.S.15.

It is thereby estimated that the potential demand for new residential construction amounted to 239 units per year between 1970 and 1975 and 272 units per year during 1975-77, as compared with the actual average construction rate of 184 units per year during 1960-1970. This acceleration in housing demand would be due in part to the employment increase in Monroe County and the consequent upturn in population. However, the greatest single factor in the ongoing demand for new residences can be identified as the retirement of existing dwelling units. The 1970-77 demand for residential units can be partitioned as follows: population increases--247 units; reduced household size--468 units; retirement of existing dwellings--967 units. It is possible that this estimated demand, which represents only potential growth, was not actually met by new construction. A higher proportion of the new jobs may have been taken by in-commuters than the figures assume. These persons may have been prevented from moving to Monroe County by the shortage of suitable housing, or, the housing shortage could conceivably have forestalled the expected reduction in average household size. However, the figures suggest the extent to which pressure exists on the housing stock.

For the City of Monroeville, information concerning the housing stock in 1975 is available from a planning study prepared by Robert S. Bateman and Associates. Monroeville is of special interest in the present context since this is the area most subject to economic impact by the proposed quarrying operation, and since Monroeville is already subject to population and housing pressures. Table B.Q.S.16 presents dwelling units from the Bateman report, plus other information for Monroeville.

The population of Monroeville increased from 3,632 persons in 1960 to 4,846 persons in 1970, a gain of 33.4 percent. However, part of this increase was due to annexation of land which already contained some residential population in 1960. For comparison purposes, it is convenient to refer to the same geographic area in 1960 as in 1970; this requires estimation of 1960 population and dwelling units in the annexed area (for which the 1970 population was 732 persons). Estimates of these quantities, based on various census information, are included in the figures presented in the first row of Table B.Q.S.16. The 1960 population within the 1970 Monroeville limits has been placed at 3,824 persons, so that the "true" Monroeville population increase during 1960-1970 amounted to 26.7 percent, or 2.4 percent per year (compounded annually). Both total and occupied dwelling units are estimated to have increased at an annual rate of 3.7 percent. This rapid growth, which caused Monroeville's share of Monroe County population to increase from 17.1 percent to 23.2 percent, was apparently related to industrial expansion in the city.

As is shown in the next-to-last line of Table B.Q.S.16, the housing survey conducted in 1975 by Bateman and Associates found a total of 1,712 dwelling units in Monroeville, of which 1,644 units were occupied. These figures indicate that the annual rates of increase in dwelling units were substantially lower after 1970 than before. Based on the

Table B.Q.S.16. Population and Dwelling Units Within the 1970 Monroeville City Limits

	Dwelling Units			Population	
	Total	Occupied	Vacant	Total	Share of Monroe County
1960*	1,107	1,024	83	3,824	17.1%
1970	1,599	1,468	131	4,846	23.2%
Annual rate of change, 1960-70	3.7%	3.7%	4.7%	2.4%	
1975	1,712	1,644	68	5,107*	24.1%
Annual rate of change, 1970-75	1.4%	2.3%	-12.3%	1.1%	

* Estimates by Environmental Science and Engineering, Inc.

Sources: U.S. Bureau of the Census, 1972.
Robert S. Bateman and Associates, 1976.

Table B.Q.S.17. Vacancy Analysis of Dwelling Units; Monroeville, 1975

	All Dwelling Units	Dilapidated Units	Other Units
Total	1,712	120	1,512
Occupied	1,644	84	1,560
Vacant	68	36	32
Vacancy rate	4.0%	30.0%	2.0%

Source: Robert S. Bateman and Associates, 1976.

reported number of occupied units and the prevailing trends in average household size, the 1975 population of Monroeville is estimated as 5,107 persons. The annual rate of population increase thus indicated, 1.1 percent, is also significantly lower than the rate occurring before 1970. These estimates are of course dependent upon the accuracy of the Bateman survey and on definitional consistency with the U.S. Census, but the general patterns identified are probably correct.

A significant finding of the Bateman report was that only 68 dwelling units were vacant in 1975, down from 131 in 1970. Furthermore, 36 of these vacant units were classed by the report as "dilapidated," meaning that their condition was so poor as to make rehabilitation infeasible. Table B.Q.S.17 presents the 1975 occupancy characteristics of dwellings in Monroeville when dilapidated units are isolated from other units (which include "deteriorating" as well as "sound" dwellings). The vacancy rate for dilapidated units was 30 percent, whereas the rate for all other dwellings was only 2 percent. The latter percentage should be regarded as an extremely low rate, in that vacancies must have been limited largely to the "fractional" variety (for example, units sold or rented and awaiting occupancy). Thus the data suggest that a significant housing shortage may have existed in 1975, which may have had an inhibiting effect upon population growth in Monroeville.

A factor which may affect housing supply at present is that the Parsons and Whittemore project on the Alabama River may have pre-empted a significant proportion of the construction labor force, which would otherwise be available for residential projects. Also, the rapidly-increasing land values in the Monroeville area may have inhibited the construction of moderately-priced housing, for which the potential demand is greatest.

The Monroeville city government has acknowledged the existence of a housing shortage, and has taken two important steps to deal with this problem. First, a 2.3-hectare (5.8-acre) site owned by the city--originally intended as the location of a new courthouse, was sold recently to a private buyer for the explicit purpose of providing about 80 apartment units. The buyer was selected on the basis of ability to provide good-quality housing, and conditions were imposed to assure that the units would reach the market quickly. Second, the city is reviewing carefully the existing land use in residential areas to identify potentially suitable locations for mobile homes. In selected cases, mobile homes will be allowed in place of conventional homes on residential lots, as long as existing zoning is not violated in other respects and the mobile homes meet various criteria. Other steps taken since 1975 to alleviate the housing shortage in the Monroeville area include completion of 46 units of publicly-supported housing for low and moderate income families, supplementing the 100 units already present, and the rezoning of substantial tracts of land for apartment use.

COMMERCIAL DEVELOPMENT

Commercial activity in Monroe, Clarke, and Conecuh counties has traditionally been small-scale in terms of both the range of services provided and the spatial extent of market areas served by the various urban centers. Sales and employment of commercial establishments have tended to mirror the growth of local industry and resource-related activities, rather than exerting an independent influence. However, certain trends in Monroeville may have important implications for future commercial development in Monroe County, vis-a-vis Clarke and Conecuh counties. Table B.Q.S.18 presents retail sales data for the impact area counties in 1965, 1970, and 1974. The sales gains over this period, when expressed in current dollars, range from 60.4 percent for Clarke County to 115.6 percent for Conecuh County.

On the other hand, the lower portion of Table B.Q.S.18 indicates that retail sales in the impact area counties have generally failed to keep pace with growth in total personal income. The ratio of sales to income dropped from 0.61 to 0.51 in Monroe County; from 0.78 to 0.56 in Clarke County; and from 0.48 to 0.41 in Conecuh County. There are several reasons why this general trend might be expected:

1. The share of personal income consisting of disposable income has decreased in each county, due to the federal tax structure and increased state and local taxes.
2. As family income levels rise, progressively larger shares of expenditure are devoted to services rather than retail trade items.
3. Increased mobility of area residents may have caused a progressively larger share of purchases to be made outside the region on vacations and on shopping trips to Mobile, Selma, and Montgomery.

The sharp increase in retail sales in Conecuh County between 1970 and 1974 is believed to be related to increased traffic through the county

Table B.Q.S.18. Retail Sales Trends in the Quarry Impact Area

	Monroe County	Clarke County	Conecuh County
Retail Sales ($1,000)			
1965	19,000	29,280	9,104
1970	26,400	35,364	11,706
1974	36,805	46,968	19,630
Percent Change, 1965-74	93.7%	60.4%	115.6%
Sales/Personal Income			
1965	0.612	0.777	0.483
1970	0.562	0.613	0.379
1974	0.507	0.558	0.412
Percent Change, 1965-74	-17.2%	-28.2%	-14.7%

Source: Alabama Development Office, 1976.
Environmental Science and Engineering, Inc., 1977.

on Interstate 65. With this exception, it is apparent that Monroe County outperformed Clarke and Conecuh counties somewhat in terms of retail trade. The ratio of sales to income generally declined less in Monroe County than elsewhere, and the Monroe County share of total sales in the three-county area increased from 33.1 percent in 1967 to 35.6 percent in 1974. Most of this increase can be attributed to commercial development in Monroeville.

An important factor in Monroeville is the presence of favorable sites for commercial establishments along the Route 21 bypass, which forms part of a four-lane corridor extending from Business Route 21 northeast of town to the Route 84 intersection at Ollie. It appears likely that this corridor will emerge over time as the principal axis of commercial and higher-density residential development in central Monroe County. The potential role of the bypass corridor is already reflected in land values. As an example, the land now occupied by the Southtown shopping facility was acquired in 1966 for $5,200 per hectare ($2,100 per acre); whereas ten years later, a less centrally located tract on the bypass sold for $22,240 per hectare ($9,000 per acre), thus indicating a land value escalation of over 15 percent per year. A small corner parcel on the bypass was recently acquired by a national restaurant chain for $50,000. The bypass has some distinct advantages for Monroeville as a community: it provides a focus for commercial establishments that could not, or would not, locate in the older central business district; yet it keeps new development fairly close to the central area and therefore potentially allows the new facilities to be complementary rather than destructive to older establishments.

Over the next few years, the commercial center of gravity of Monroeville will continue to shift to the southeast. Given the rapid economic growth expected for Monroeville and the availability of good commercial sites, it is not unlikely that one or more new shopper-goods stores will be constructed in the near future. The overall services sector in Monroeville should continue to expand relative to commercial activity in the other nearby urban centers. A long-run prospect is that Monroeville may move up in terms of the range of services provided and may emerge as the dominant service center for much of Clarke, Conecuh, and Wilcox counties.

LAND USE SETTING

PRESENT LAND USE

Figure B.Q.S.1 shows the present land use in the vicinity of the Ideal Basic Industries quarry site. A large portion of the area consists of forested lands whose use is limited to hunting and harvesting of forest products. Other major land uses are primarily agricultural--improved pasture and croplands, improved pasture transitional state, thinned hardwoods, and woodland pasture. There are several single family residences in the area, but by comparison to the other land uses, they represent a very small proportion of the total land area.

Most of the residential units are located along Monroe County Road No. 1, locally known as Stockton Road. All dwellings on this road are at least 1 kilometer (0.6 mile) from the closest proposed areas which will be quarried during the next 15 years. One unit is located south of the property on a branch of Randons Creek, approximately 2.5 kilometers (1.5 miles) from the closest quarrying activities. All other residential lands in the area are southeast of the Ideal property, about 3 to 5 kilometers (2 to 3 miles) from the proposed quarrying activities.

The Ideal property is presently devoted to agricultural use. Much of the southern half is improved pasture with some fodder crops. The north central portion of the site has been recently cleared and is in the transitional state to improved pasture. North of this area and along the bank of the river are thinned hardwoods. Although some of the hardwood areas have been harvested more than others, they are all fenced and accessible to grazing cattle.

As shown in Figure B.Q.S.1, improved pasture and croplands are scattered around the perimeter of the Ideal property to the north, east, and south. Most of these are associated with the residential properties discussed previously and are family-operated, small-scale farming activities.

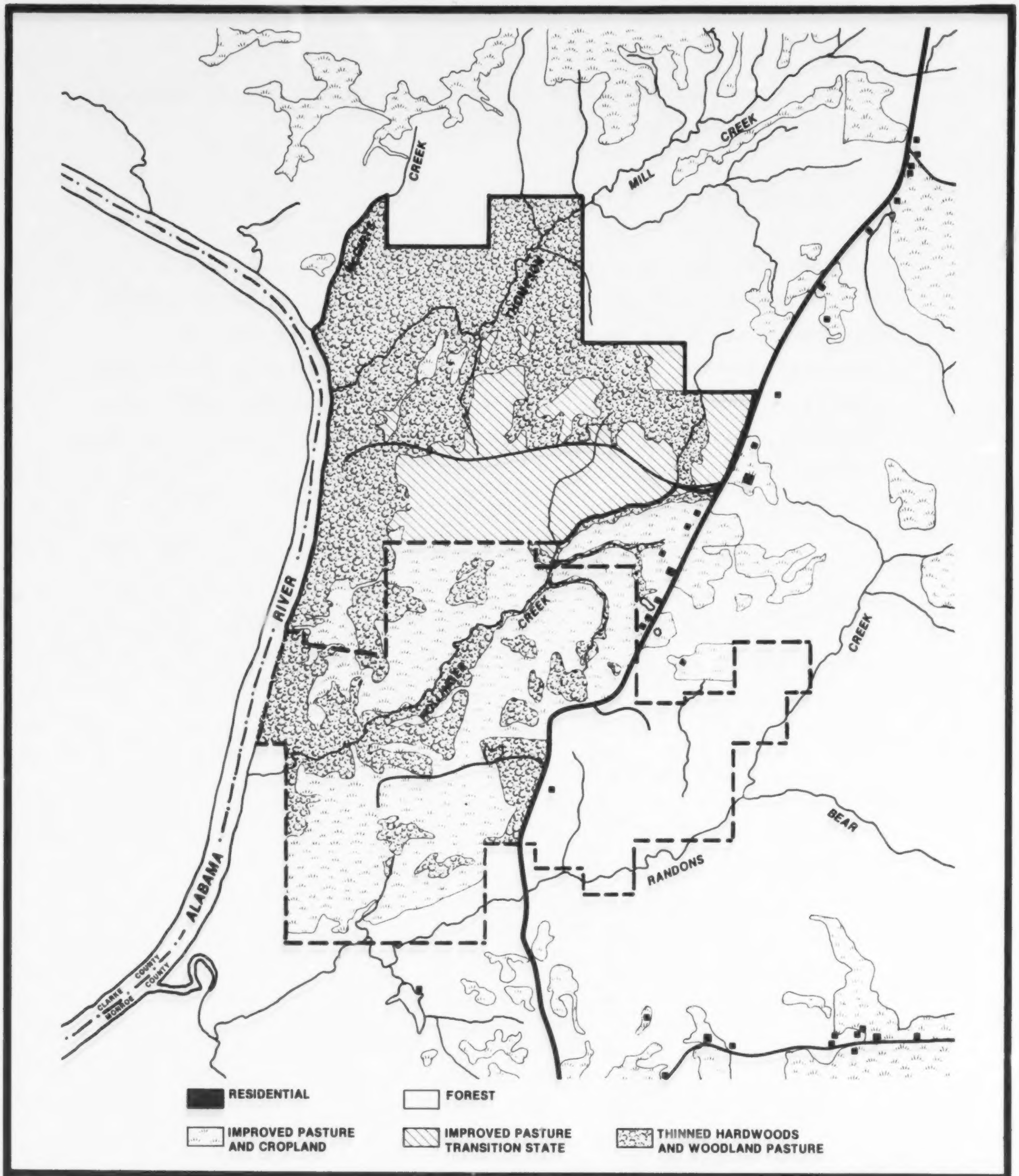

CREEK
MILL
CREEK
THOMPSON
RIVER
CREEK
CREEK
BEAR
RANDONS
ALABAMA
CLARKE COUNTY
MONROE COUNTY
RESIDENTIAL
FOREST
IMPROVED PASTURE AND CROPLAND
IMPROVED PASTURE TRANSITION STATE
THINNED HARDWOODS AND WOODLAND PASTURE

Figure B.Q.S.1
PRESENT LAND USE IN THE VICINITY OF THE PROPOSED IDEAL BASIC INDUSTRIES QUARRY SITE

0 0.5 1
SCALE IN KILOMETERS

SOURCE: Environmental Science and Engineering, Inc., 1977.

REGION IV
U.S. ENVIRONMENTAL PROTECTION AGENCY ENVIRONMENTAL IMPACT STATEMENT FOR IDEAL BASIC INDUSTRIES

PROPOSED GAILLARD QUARRY
MONROE COUNTY, ALABAMA

All other lands within a 2 to 3 kilometer (1 to 2 miles) perimeter of the Ideal property are heavily forested.

FUTURE LAND USE

The potential impacts of the Ideal Basic Industries quarrying activities on land use and land value are limited to the Ideal property itself. Those areas which are to be quarried over the next 15 years are currently forested or in a transitional state from forest to improved pasture. Present land use trends are expected to prevail with most lands in the vicinity remaining predominantly in agricultural use and forests.

COMMUNITY FACILITIES

The discussion of community facilities and services will focus largely upon Monroe County, especially the City of Monroeville. The city, which has a mayor-council form of government, hired in 1976 a full-time city administrator who coordinates all phases of local government operation. Organized budgeting procedures have been instituted, and the city no longer has to borrow to cover short-term cash shortages. For fiscal 1977, the city has budgeted expenditures of approximately $620,000, as against expected revenues of $686,000. The Monroe County budget for the same period involves $1.34 million in expenditures and approximately $1.5 million in income. The county government can be characterized as fiscally conservative, as evidenced by the fact that the county has maintained a net worth of over $1.4 million, of which more than $1 million was in cash.

A primary source of local government revenue in Monroe County is the property tax, involving total millage rates of 35 in Monroeville and 25 in unincorporated areas of the county. Half of the city's ten mills is currently allocated to the sewer bond fund. A complete re-evaluation of real property in the city is underway by an outside appraisal firm, and should be completed by the end of 1977. The re-evaluation is expected to increase tax revenues, but should not affect ad valorem tax rates, which have not changed in 4 years. Sales taxes paid by Monroe County residents include the 4 percent state sales tax, a 1 percent countywide school tax, and 1 percent city tax in Excel and the Monroeville police jurisdiction.

Planning assistance to Monroe County is provided very actively by the Alabama-Tombigbee River Regional Planning and Development Commission, which has recently prepared a preliminary comprehensive development plan for the county. The City of Monroeville enforces zoning regulations and building codes within its corporate limits and exercises subdivision review within the police jurisdiction extending 2.4 kilometers

(1.5 miles) beyond the corporate boundary. The city became eligible for the Federal Flood Insurance Program in 1975.

Regulation of land use has gained acceptance somewhat more slowly in other Monroe County communities. A 1975 controversy over zoning in Frisco City, for example, ended with the rejection of zoning as a concept for that municipality. Areas outside the police jurisdiction of municipalities are virtually free of land use control, including building permit requirements. A possible future problem is that the willingness of municipal authorities to extend utilities to such areas could divert an undue proportion of new development away from existing communities, where it would be subject to some degree of regulation and would contribute to municipal revenues. A mitigating factor, however, is that hazards and conflicts involving land use are minimized by the low density of development prevailing in most of the county. The following paragraphs will review briefly the status of various county and municipal services.

Health Care

Table B.Q.S.19 presents various statistics describing health care facilities and personnel in the impact area counties. All three counties are below the State of Alabama in terms of the number of doctors, nurses, and hospital beds per capita. However, the differences are related to the fact that the counties lack some facilities which would be appropriate only to a regional health care center. In Monroe County, a $1-million expansion of the county hospital was completed in 1974, including a new wing with 25 beds. The current rating of 75 beds is somewhat below the standard of 4.5 beds per thousand persons recommended by the U.S. Public Health Service in 1973, but plans call for expansion of capacity by approximately 50 percent over the next ten years. At present, the hospital is actively soliciting donations for construction of a sizeable addition.

Table B.Q.S.19. Health Care Statistics for Impact Area Counties

	Monroe County	Clarke County	Conecuh County	State of Alabama
Hospital Beds				
Number: 1972	54	114	44	
1975	73	126	44	
Per 1,000 Population:				
1972	2.6	4.2	2.9	4.7
1975	3.5	4.7	2.9	5.1
Nursing Home Beds				
Number, 1975	111	141	51	
Per 1,000 Population	5.3	5.2	3.3	4.9
Medical Doctors				
Number, 1975	7	11	3	
Per 10,000 Population	3.3	4.1	1.9	7.7
Registered Nurses				
Number, 1975	32	34	18	
Per 1,000 Population	1.5	1.2	1.1	2.7
Other Health Care				
Dentists, 1975	6	7	3	
County Health Nurses, 1975	5	2	1	

Source: Alabama Department of the Public Health, 1976.

Monroe County hospital facilities presently include an 8-bed coronary care unit, two operating rooms, an emergency room with 24-hour physician coverage, and a laboratory that is utilized by a number of other health care institutions. The hospital provides specialized services such as inhalation therapy, X-ray, and family counseling. Twenty-four hour ambulance service is available.

Education

Public school enrollment has been declining in all three of the impact area counties, as shown in Table B.Q.S.20. Between 1971 and 1974, the decline amounted to about 6 percent in Monroe County, 3 percent in Clarke County, and 8 percent in Conecuh County. However, a significant fact regarding the enrollment decline in Monroe County is that there has been a corresponding increase in enrollment at Monroe Academy, a private school in Monroeville serving grades 1 through 12. By the 1976-77 school year, Monroe Academy accounted for roughly 10 percent of all secondary school enrollment in the county.

The total number of elementary and high school students is lower than before 1970 but appears to have stabilized recently. For example, the initial data for the 1976-77 school year indicated that a decline of 61 pupils in public secondary schools was offset by an increase of 65 at Monroe Academy. The other information for public school systems presented in Table B.Q.S.20 suggests that the impact area counties compare favorably with other districts in Alabama. Expenditures per pupil are consistently higher than for the state as a whole, and the pupil/teacher ratio is slightly lower. Not shown in Table B.Q.S.20 is the fact that the Monroe County school budget has increased rapidly after 1974, to over $4 million in fiscal 1976.

Monroe County is the location of Patrick Henry State Junior College, which has roughly doubled in enrollment since 1973. In 1976, approximately 400 day students and 600 night students attended this institution, whose goal is to provide low-cost education to any high school

Table B.Q.S.20. County School Information, Grades 1-12, For Impact Area Counties

	Monroe County	Clarke County	Conecuh County	State of Alabama
Total Enrollment				
1971	5,266	4,494	3,514	
1974	4,930	4,357	3,235	
Total Expenditures ($1,000)				
1971	2,758	2,496	1,932	
1974	3,171	2,828	2,374	
Expenditures/Pupil ($)				
1971	524	535	550	465
1974	643	649	734	623
Teaching Positions				
1971	256	232	197	
1974	241	219	167	
Pupils per Teacher				
1971	21	19	18	23
1974	20	20	19	21

Source: Alabama Department of Education, 1971; 1974.

graduate interested in pursuing college work. A vocational-technical school is also located in Evergreen, Conecuh County.

The Monroe County Board of Education launched a building program in 1970 which has involved: construction of two gymnasiums; renovation of two vocational buildings, plus construction of another; and erection of a new school building serving grades 1 through 12 at Lower Peachtree. Construction also began in 1976 on a new high school in Monroeville. Completion of this facility will allow the grades presently occupying the middle school to shift into the old high school building, whereupon the middle school building will become a second elementary school. It has been estimated that these facilities could accommodate as many as 500 additional pupils if necessary, according to John Butz, City Administrator. An additional development has been the initiation of kindergarten programs in 1974.

Future public school enrollment in Monroe County will be dependent upon a number of factors, two of which are the birthrate and the share of students educated in private schools. The Monroe County birthrate has declined dramatically in recent years, from 24.0 births per 1,000 population in 1970 to 18.8 in 1974. However, part of this decline has resulted from past migration patterns, i.e., from the loss of young adults of child-bearing age. Unless private education continues to claim an increasing share of total enrollment, it is likely that the number of public school students will eventually stabilize and perhaps begin to increase, due to the reversal of past migration flows. The increase, if it occurs, should be sufficiently slow that the number of students present in 1992 will not exceed the capacity of facilities present in 1977. Therefore, school construction can be limited to projects aimed at upgrading or altering the geographic distribution of facilities.

Law Enforcement

Monroe County is among the ten lowest counties in Alabama in terms of both violent crime and property crime. The Sheriff's Department of Monroe County employs four deputies to patrol the portion of the county located outside the police jurisdiction of Monroeville and other municipalities. Detention facilities are adequate, and are being utilized by the City of Monroeville as well as the county. The Monroeville Police Department employs 16 full-time policemen, up from 11 in 1974, plus four communications technicians equipped with a teletype computer.

Water and Sewer Service

The Bateman report estimated in 1975 that approximately 1,500 dwelling units in Monroeville were served by the Monroeville sanitary sewer system. Since that time, a program of expansion and rehabilitation of the sewer system has been undertaken, and construction has begun on a new treatment plant at Double Branches which will meet current standards. The new plant, to be completed in 1978 with 75 percent Federal funding, will serve Frisco City as well as Monroeville. The population-equivalent design capacity of the plant will be 9,600 persons, of which the present flows account for only about 62 percent. The facility is thus intended to fulfill the needs of the community for at least ten years in the future. When capacity is reached, the design of the plant will readily allow expansion to serve a population of perhaps 15,000 to 18,000.

The Monroeville water supply is obtained from three wells at a depth of about 120 meters (400 feet). Daily capacity of the wells is 2.65 million liters (700,000 gallons). Pumping capability is about 12,100 liters (3,200 gallons) per minute. There are two ground level tanks and four elevated tanks, with storage in the latter for 3.8 million liters (1 million gallons). The Monroeville Water Board is currently selling bonds to raise approximately $1 million for drilling of another well, which is expected to meet water requirements for at least several years in the future. A major expansion of the Monroeville water system was recommended to the Board by consultants in 1976. Near the Excel Water Board has agreed to provide water to new residential customers located considerably beyond the Excel municipal boundary, in the vicinity of Route 84. Federal financial support for extension of the Excel and Mexia water lines was announced in November of 1976.

Fire Protection

The Monroeville Fire Department has an emergency van and four tank trucks, the largest of which is a $91,000 unit added in January, 1977. There are 38 firemen active on a volunteer basis. Monroeville at present provides fire protection services to most of the county.

Highway Transportation

There is no public transportation in Monroe County other than intercity bus service. The major highway system consists of U.S. Route 84, passing east-west through the county, and Alabama Route 21 running north-south, supplemented by Alabama Highways 41, 47, and 59. Table B.Q.S.21 presents traffic flow information for various points on Routes 84 and 21 in the years 1970 and 1976. The increases in traffic volume during this interval are notable, particularly on Route 84 between Mexia and the Conecuh County line. The data are deficient for Route 21 between Monroeville and Route 84; but it is clear that daily volumes exceed 5,000 near Monroeville. Traffic nevertheless moves well in the Monroeville area because Route 21 is four-lane in this vicinity and allows through traffic to bypass the downtown district. On the whole, the Monroe County highway system appears more than adequate to convey existing traffic flows.

Recreation

Recreation facilities in Monroeville include a park, tennis courts, ball fields, and a swimming pool. An application is currently pending with the U.S. Bureau of Outdoor Recreation for a grant to provide a complete park and recreation center. The application was delayed by property

Table B.Q.S.21. Traffic Flow Information for Highways in Monroe County

	Average Daily Traffic Count		
	1970	1976	Percent Change
U.S. Route 84			
Clarke County Line	1,380	1,540	11.6
West of Mexia	1,610	2,190	36.0
East of Mexia	890	1,380	55.1
East of Route 21	1,550	2,780	79.4
Conecuh County Line	1,650	2,530	53.3
Alabama Route 21			
South of Beatrice	1,130	1,130	0.0
North of Monroeville	2,030	2,490	22.7
South of Monroeville	5,070	-----	----
South of Route 84	2,750	3,540	28.7
South of Frisco City	2,870	3,210	11.8
North of Uriah	1,810	2,170	19.9
Escambia County Line	1,500	1,670	11.3

Source: Alabama Department of Highways, 1970; 1976; 1977.

re-evaluation requirements, but prospects for the park now appear good. The city employs a full-time recreation director.

On a larger scale, the existing countywide recreation facilities are described as "lacking" by the Monroe County Preliminary Comprehensive Development Plan. State recreational land in the county is limited to the Little River State Park near Uriah and one public fishing lake. There is a wildlife management area in Clarke County, but no state recreational land in Conecuh County. An important recreational resource in Monroe County is the Claiborne Lock and Dam area maintained by the U.S. Army Corps of Engineers, which contains boat launching and fishing facilities, public restrooms, 14 picnic tables, and more than 3 kilometers (2 miles) of hiking trails. There are an additional 16 tables and 3 kilometers of trails at Silver Creek Park located further north on the Alabama River just across the Clarke County line. According to the Environmental Impact Assessment prepared for Parsons and Whittemore in 1974, there is a deficit of swimming, camping, hiking, and golfing facilities in Monroe County; and additional land for big game hunting will be needed by 1990 (Associated Water and Air Resources Engineers, Inc., 1975).

Electric Service

Electric service is provided in the vicinity of the proposed Ideal Basic Industries quarry site by both Alabama Power Company and the Alabama Electric Cooperative. Alabama Power has a substation at Perdue Hill (northeast of the quarry site) and a 12 kv transmission line along Stockton Road (County Road No. 1). Power is supplied through the integrated Alabama Power Company network which includes generation facilities at Mobile, Dothan, and elsewhere. The Alabama Electric Cooperative is currently expanding its power generation capability by the addition of two 235 Mw facilities which will be on-stream in early 1979. The Cooperative will have an excess generating capacity of roughly 100 Mw at that time.

Summary

On the whole, the Monroeville community appears well equipped in terms of physical facilities and governmental awareness to deal with future population growth. Virtually all categories of public service have been expanded in the last four years, and long-range planning of facility requirements is becoming prevalent. One example of the flexibility of the city administration in addressing the needs of the community with limited resources was the decision not to build a new city hall as originally proposed, but instead to renovate the existing municipal building at a much lower cost, and to utilize the land that had been acquired for the new building as a means of promoting much-needed housing development. A proposal was recently considered to annex two residential communities north of Monroeville but was rejected on the basis of a cost-benefit analysis conducted by regional planners. Whether or not further annexation takes place, it appears that a substantial proportion of the new residential development occurring in the Monroeville/Frisco City/Excel area will be located outside municipal boundaries. Given the prevailing governmental structure of Alabama, in which county governments are involved in a much narrower range of public services than municipal governments, the major problem caused by population growth could be the creation of geographical imbalances between public service needs and the ability of existing institutions to meet these needs.

PROJECTED 1992 ENVIRONMENT

The most important single development affecting the impact area is the $266 million Parsons and Whittemore, Inc. pulp mill which is now under construction at Claiborne in Monroe County. The peak construction labor force involved in this project amounts to about 1,000 workers. Permanent operations at the Parsons and Whittemore plant will generate $5,561,000 in annual income for approximately 350 employees. The plant will spend $18.6 million annually for wood purchases in a 19-county region. Monroe, Clarke, and Conecuh counties are expected to account respectively for 12.75 percent, 12.0 percent, and 6 percent of the total stumpage cost. Thus, Parsons and Whittemore will create about $1.7 million in additional income and 125 new forest-related jobs in Monroe County alone. These and other aspects of the Parsons and Whittemore operation are described in detail in the "Environmental Assessment Study for a New Pulp Mill in Alabama" (Associated Water and Air Resources Engineers, Inc., 1975).

Several other industrial development projects in Monroe County have either been announced or are under construction. A new Scotch Plywood plant in Beatrice was announced in November of 1976 and involves an investment of 8 to 9 million dollars. This operation will employ 125 to 130 persons, with a payroll of approximately 1.6 million dollars. Another wood products plant is to be constructed by Georgia Pacific at Peterman. Finally, in June of 1976, Vanity Fair in Monroeville announced an expansion of warehouse facilities which could account for 250 to 300 new jobs. When the forest-related employment created by Parsons and Whittemore is included, these developments could add close to 1,000 jobs in Monroe County within the next 5 years.

Forecasts of population and resident employment for counties in Alabama have been prepared by the Alabama Development Office in conjunction with federal agencies (U.S. Department of Agriculture, Economic Research Services, 1975). The forecasts for impact area counties are presented in Table B.Q.S.22. According to the OBERS series, the population of

Table B.Q.S.22. OBERS Forecasts for Impact Area Counties

	1970	1980	1990	2000
Population				
Monroe County	20,900	21,900	22,600	22,200
Clarke County	26,700	28,200	30,500	32,100
Conecuh County	15,700	15,900	15,700	15,300
Resident Employment*				
Monroe County	6,900	8,100	8,600	8,900
Clarke County	8,500	10,200	11,300	12,500
Conecuh County	4,900	5,500	5,600	5,800

* Workers by county of residence, census definition, including workers 14 and 15 years old.

Source: U.S. Department of Agriculture, Economic Research Services, 1975.

Monroe County will increase by only about 5 percent during 1970-1980, and by about 3 percent between 1980 and 1990, followed by a downturn after 1990. Clarke County would experience slightly greater growth than Monroe during 1970-1980, and considerably faster growth thereafter. The population of Conecuh County would rise very slightly between 1970 and 1980 but would decline thereafter. In the opinion of planners at the Alabama-Tombigbee Regional Commission, the OBERS forecast for Monroe County does not reflect the full impact of the Parsons and Whittemore facility and other developments in the county. Therefore, an alternative forecast is developed here to describe the baseline future condition, which differs moderately from that projected by OBERS.

The forecast is prepared by relating population in Monroe County to non-agricultural wage and salary employment within the county. Nonagricultural wage and salary employment differs from total resident employment, such as reported by the Census, in that it excludes: 1) farm workers; 2) proprietors and other self-employed persons; and 3) net commutation of Monroe County residents to jobs outside the county. The benchmark years utilized in preparing forecasts are: 1970, 1977, 1985, and 1992. Estimates for other years are obtained by interpolation. The basic procedure is to project the number of jobs and the ratio of population to jobs in each of the forecast years, and to obtain population as the product of these quantities.

The employment gains which are projected to occur during the 1977-1985 period are based upon industrial development projects that have already been announced. As indicated earlier, these projects could result in an employment increase of 850 persons, distributed among industry groups as follows: pulp mill products, 350; other lumber and wood products, 250; and apparel manufacturing, 250. Employment in forestry and timber harvesting (some of which would not be wage and salary employment) is not included. It is true that some of these 850 manufacturing jobs may not materialize as planned, but this possibility is offset by the fact that the projections make no explicit allowance for other new industries (e.g., a possible paper manufacturing operation linked to the pulp mill) or for expansion of existing industries.

The creation of 850 manufacturing jobs in Monroe County will have a "multiplier" effect upon other sectors of the local economy, thus stimulating additional jobs. The size of the employment multiplier in a small community such as Monroe County is highly variable, depending upon factors such as relative wage levels and the amount of excess capacity in service establishments, but should generally fall between 0.5 and 1.0. (That is, each new manufacturing employee creates demand for between one-half and one new employee in nonmanufacturing sectors.) The Impact Assessment for the Parsons and Whittemore facility suggests that a value of 0.68 might be appropriate. However, the present forecasts assume that the overall increase in nonmanufacturing employment during 1977-1985 will be equal to the manufacturing employment increase, namely 850 jobs. The assumed multiplier is high because: (1) the gain in nonmanufacturing employment will include most of the forest-related jobs created by Parsons and Whittemore; and (2) a number of the nonmanufacturing sectors in Monroe County are currently subject to growth forces which are partially independent of future manufacturing expansion. Employment trends after 1985 are somewhat more uncertain. The present forecast assumes, conservatively, that manufacturing employment will increase by only 300 additional jobs between 1985 and 1992. However, the expansion of nonmanufacturing sectors during this period is assumed to continue at only a slightly lower rate than before. This would reflect the ongoing transition of Monroe County to a more service-based economy, as has already occurred in many similar communities. The resulting employment forecasts are presented in Table B.S.Q.23. It should be noted that the April, 1977, employment data which are used as a base for the forecasts were not affected significantly by construction activity at the Parsons and Whittemore plant. (Total construction employment was 210 workers, down from an average of 320 in 1974.) Thus, the present forecasts essentially skip over the short-term construction impact of the pulp mill.

The ratio of total population to nonagricultural wage and salary employment in Monroe County declined significantly between 1970 and 1975, from

Table B.Q.S.23. Forecasts of Nonagricultural Wage and Salary Employment in Monroe County

	April 1977	Change 1977-1985	1985	Change 1985-1992	1992
Manufacturing	3,250	850	4,100	300	4,400
Nonmanufacturing	2,990	850	3,840	750	4,590
TOTAL	6,240	1,700	7,940	1,050	8,990

Source: Environmental Science and Engineering, Inc, 1977.

==

Table B.Q.S.24. Comparison of Population Forecast for Monroe County with OBERS Series E Projections

Monroe County Population	ESE Forecast	OBERS	Deviation of ESE from OBERS Number	Deviation of ESE from OBERS Percent
1970	20,900	20,900	0	0
1977	21,700	21,600*	100	0.5
1980	22,400*	21,900	500	2.3
1985	23,600	22,300	1,300	5.8
1990	24,600*	22,600	2,000	8.8
1992	25,000	22,500*	2,500	11.1
Increase, 1977-1992	15.2%	4.2%		

* Denotes interpolated values.

Source: U.S. Department of Agriculture, Economic Research Service, 1975.

3.97 to 3.60 (see earlier tables). The most likely explanations would be the continuing decline in agricultural employment and the increase in the proportion of jobs held by commuters from outside the county. The present projections assume that this ratio will continue to decline at the same geometric rate through 1985, and at half this rate during 1985-1992. This assumption is relatively conservative, in that it moderates the impact of employment increases on population. The resulting forecast is that the population of Monroe County will increase from an estimated 21,700 persons in 1977, to 23,600 persons in 1985, and 2,500 in 1992. The implied annual rates of population growth amount to slightly over 1.0 percent per year during 1977-1985, and approximately 0.8 percent per year during 1985-1992. These estimates are presented and compared with the OBERS series in Table B.Q.S.24; interpolated values are denoted by asterisks. The projected population for 1992 exceeds the OBERS forecast by approximately 11 percent.

Table B.Q.S.25 presents forecasts of households and numbers of dwelling units in Monroe County based on the population projections just described. The key element in these forecasts is the ratio of population (less persons living in group quarters) to the number of households. Rapid declines in this ratio are widespread in United States communities because of: (1) reduced birthrates; (2) greater ability of young adults, both married and unmarried, to maintain separate households; (3) increase in the number of single-parent families; and 4) increasing importance in the population of older persons whose children have left home. Because of these factors, average household size will probably continue to decline in Monroe County, although at a less precipitous rate than in the past. The projections assume that persons per household will decline from approximately 3.25 in 1977 to 3.10 in 1985 and 3.00 in 1992, the latter figure representing what is felt to be a reasonable lower limit for a predominantly rural area such as Monroe County. The resulting projections of households are presented in the fourth row of Table B.Q.S.25. Households are expected to increase by slightly over 25 percent during the 1977-1992 period.

Table B.Q.S.25. Household and Dwelling Unit Forecasts for Monroe County

	1970	1977	1985	1992
Population	20,883	21,700	23,600	25,000
Population in households	20,801	21,600	23,500	24,900
Population per household	3.51	3.25	3.10	3.00
Households	5,932	6,600	7,600	8,300
Dwelling units built before 1970	6,674	5,700	4,700	4,000
Less: vacant units	- 742	- 700	- 600	- 500
Occupied dwelling units built before 1970	5,932	5,000	4,100	3,500
Post-1970 units	--	1,600	3,500	4,800
Required annual rate of construction (interval ending with year shown)	--	235	232	186

Source: Environmental Science and Engineering, Inc., 1977.

The lower portion of Table B.Q.S.25 presents projections of the required construction of new dwelling units in Monroe County, based on the same methodology used earlier to develop current estimates for the county. The 2.27 percent annual loss rate of existing dwellings which was observed during 1960-1970 is assumed to continue throughout the 1970-1992 period for dwellings built before 1970. However, there is assumed to be no loss of dwelling units built after 1970. The overall loss rate of dwelling units thus declines to 1.55 percent per year during 1977-1985, and 1.27 percent per year during 1985-1992, reflecting an overall stabilization of the housing stock because of progressive elimination of existing substandard units. The 4,000 pre-1970 units projected to remain in 1992 are roughly equal in number to the units present in 1970 that were constructed after 1940. The number of vacant units are assumed to decline gradually, despite overall growth in the housing stock, because of projected elimination of substandard units (for convenience, Table B.Q.S.25 treats vacancies as if only pre-1970 units would be vacant; but the existence of vacancies in post-1970 units is also accounted for in the estimates). The overall vacancy rate would decline from about 10 percent in 1977, to 7.3 percent in 1985 and 5.7 percent in 1992.

The next-to-last row of Table B.Q.S.25 indicates the required construction of dwelling units in Monroe County after 1970. Each of these figures is obtained as the difference between the number of households and the number of occupied units built before 1970. A total of 4,800 post-1970 dwelling units will be needed to house the projected 1992 population, up from 1,600 such units in 1977. The required rate of housing construction would be about 230 units per year through 1985, and somewhat less than 200 units thereafter. The magnitude of the task is indicated by the fact that between 35 and 40 percent of all dwelling units which will exist in Monroe County in 1992 are not currently present.

Table B.Q.S.26 presents similar forecasts for the City of Monroeville, developed using 1975 as the base year for projection. Monroeville

Table B.Q.S.26. Population and Household Forecasts for Monroeville (1970 City Limits)

	1970	1975	1985	1992
Population	4,846	5,107	6,110	6,790
Share of Monroe County population	23.2%	24.1%	25.9%	27.2%
Population in households	4,764	5,020	6,020	6,700
Population per household	3.25	3.05	2.90	2.80
Number of households	1,468	1,644	2,070	2,390
Dwellings built before 1970	1,599	1,480	1,305	1,215
Less: vacant units	- 131	- 68	- 75	- 75
Occupied units built before 1970	1,468	1,412	1,230	1,140
Post-1970 dwelling units	--	232	840	1,250
Required annual dwelling construction (during preceding interval)	--	46	61	59

Source: Environmental Science and Engineering, Inc., 1977.

population--referring to population within the 1970 city boundary--is expected to increase at a somewhat slower rate than occurred during 1960-1970, but at a faster rate than apparently prevailed between 1970 and 1975. It is significant that, between 1960 and 1970, more than half of the population increase occurred outside of the 1960 corporate limit (732 of 1,214 persons). The same pattern may occur with respect to future growth inside versus outside of the 1970 corporate boundary. The specific forecast is based on the assumption that the share of Monroe County population located within the 1970 Monroeville boundary will increase in the future at the same rate as during 1970-1975. With Monroeville population thus pegged closely to the county population, the forecast calls for an upturn in the annual growth rate to about 1.8 percent per year during 1975-1985 (as opposed to 1.1 percent during 1970-1975), followed by increases of about 1.5 percent per year after 1980. The household and dwelling unit projections shown in the lower portion of Table B.Q.S.26 are based upon a continuing decline in average household size, and loss of dwelling units built before 1970 amounting to 1.5 percent per year during 1970-1975, 1.25 percent per year during 1975-1985, and 1.0 percent per year after 1985. The forecasts imply that the rate of new dwelling unit construction must rise to approximately 60 units per year.

The Bateman report recommended in 1976 that 640 new dwelling units be constructed in Monroeville by 1981 (Robert S. Bateman and Associates, Inc., 1976). These would include 88 units to provide for families displaced from dilapidated housing (which would be destroyed as part of the plan) and 552 other new units. However, the present forecasts call for only about 366 new units within the existing corporate boundaries by 1981. The difference results primarily from different assumptions about the overall rate of population growth in Monroeville. The Bateman report apparently projects a continuation of the 1960-1970 population trend, notwithstanding the role of annexation during that period. The recommended goal of 2,232 standard housing units in Monroeville by 1981 would be consistent with a population of roughly 6,500 persons, whereas the present forecast would place the 1981 Monroeville population at about 5,700.

Currently, several new residential developments are announced or under construction in the Monroeville area. These include two residential subdivisions of approximately 100 units each, and a total of 156 apartment units planned for two sites in Monroeville. There is some question whether this rate of construction will be sufficient to meet the projected demand for housing, although the new apartments should help to alleviate the present shortage of good quality rental units. Two factors working against expansion of moderately-priced housing in the county are the escalation in construction costs and the existence of widespread land speculation, which has reportedly affected land values throughout a large area around Monroeville. A logical solution would be continued growth in the number of mobile homes. However, there are reportedly few spaces available in existing mobile home parks at the present time.